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The Chemical Age

VOL LXII 11 NOVEMBER 1950 No 1635

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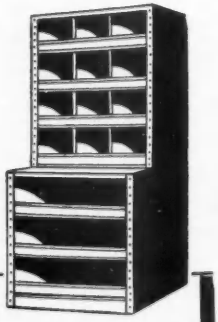

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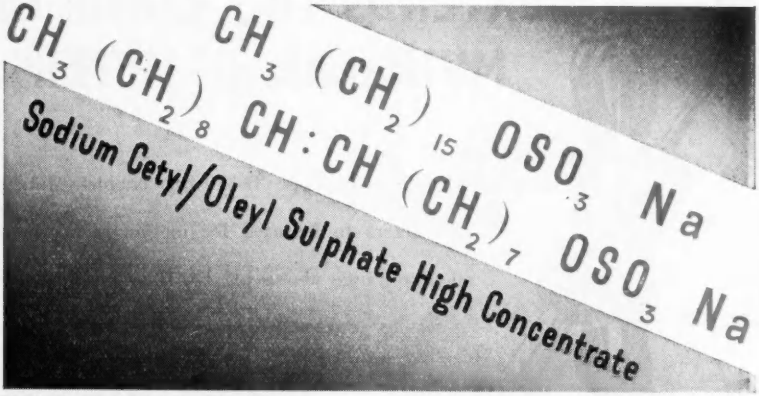


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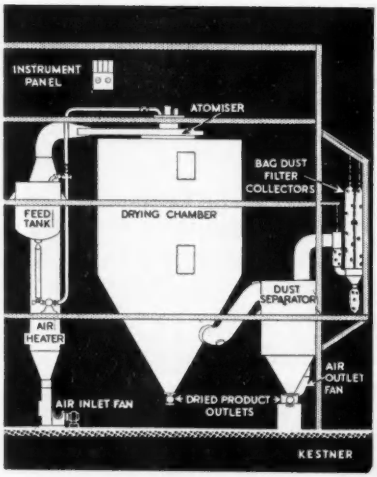


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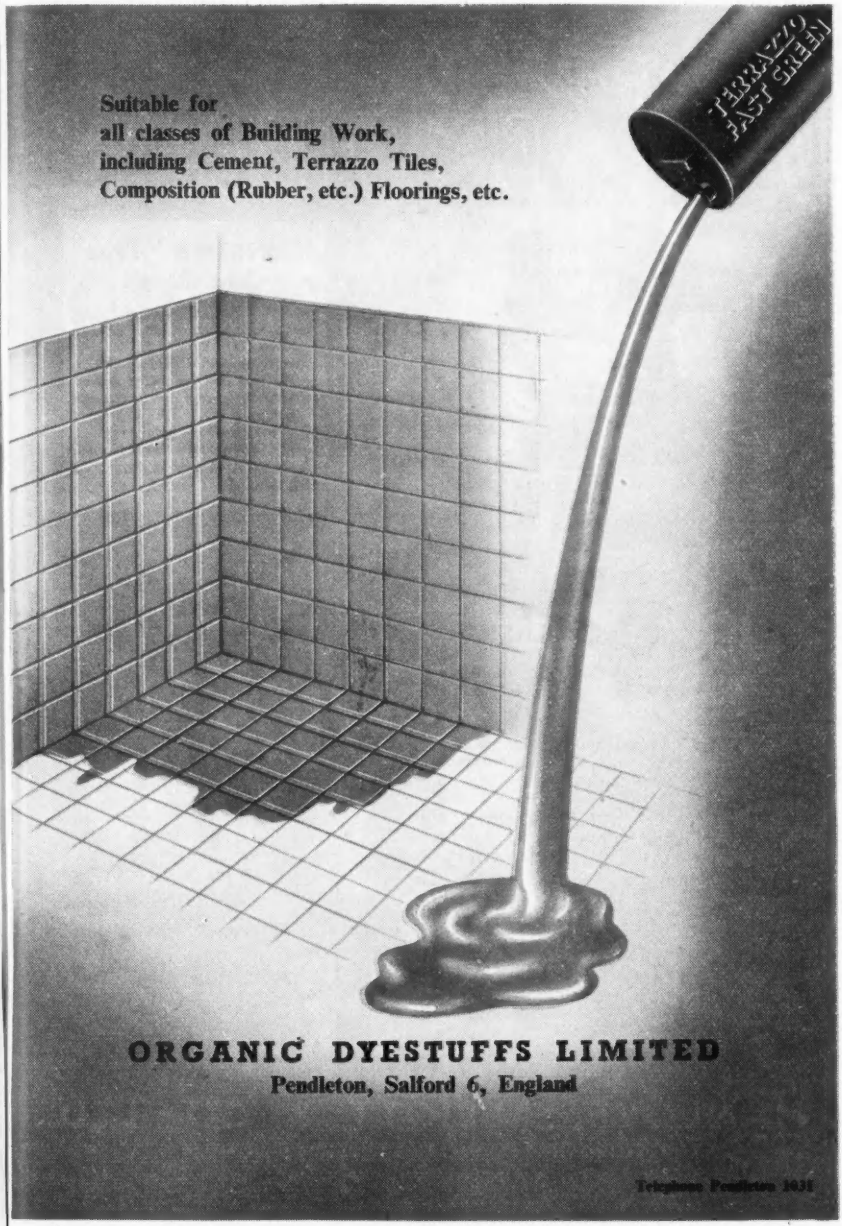


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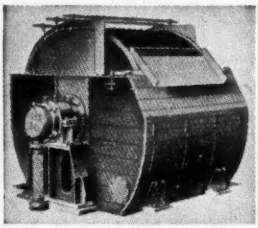

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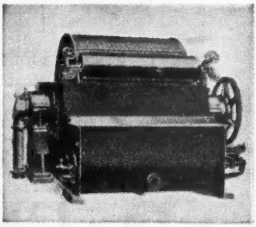

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Volume LXIII 11 November 1950 Number 1635

## Training Chemical Engineers

THE Ministry of Labour report on the future supply and demand for chemical engineers (THE CHEMICAL *Age*, *63*, 633) suggests that any young man with a well defined bent for chemistry and machines can look forward to a lifetime of full and well rewarded employment if he can acquire the increasingly exacting training. Over the next five years, 1096 newly qualified chemical engineers will come from the universities, technical colleges, and the Institution of Chemical Engineers; but industry is expected to require in the same period 1310. That clearly does not overstate the prospects for the chemical engineer, for whom there would, it is certain, be many more openings if trained men were available. It is still not uncommon for chemical engineering posts to be held by chemists with some knowledge of engineering or by engineers with some knowledge of chemistry.

The committee has rightly insisted that chemical engineering is neither applied chemistry nor applied physics, and certainly not some arbitrary blend of chemistry and engineering. It is an applied science in its own right, with its own fundamental principles. Ideally it requires a four-year course after an intermediate science degree; at present, however, it is felt that an extension of the usual three-year course should not be urged. That recommendation calls to mind the fact that it is little more than a generation since a one-year special course after the acquisition of a degree in chemistry was considered a suitable university training in chemical engineering. The period from the intermediate stage was still three years, but the active study of engineering did not begin until the third year.

In view of the greater complexity and the high investment value of modern chemical engineering projects, it is not illogical to suggest that a substantial part of the young man's total education might take place in chemical industry itself, that the final stage should be "in-training." If industry expects too much from university education, broader aspects of that education will inevitably be sacrificed. A number of authoritative organisations have stressed the importance of general education, of well developed powers of expression, and of such subjects as economics, social science, and even law. The universities cannot meet all these requirements unless the period of education is considerably lengthened.

Industry has, however, shown great aptitude for turning chemists into improvised chemical engineers, and has set up some effective joint teams of chemists and engineers; it would not

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seem more costly or cumbersome to complete the specialised education of young chemical engineers during an initial period of employment. This is already being done on a fairly wide scale. Completing an education means, however, much more than the usual process of "setting" the freshly qualified graduate in the mould of industry. The "in-training" would have to be widely planned and certainly not limited by the specific interests and needs of an employing company.

Such a system would almost certainly provide more chemical engineers and probably better ones. While the total period for education would be longer, the economic burden upon young men or their parents would be eased at the end of the university stage. The initial education at a university or college would necessarily be broadly conceived. The problem of cramming a four-year task into three years would no longer dominate the design of curricula. The second stage, within industry, would have the advantage of a highly practical environment, and would provide much more intimate contact with chemical plant and processing than is possible at universities. The constant danger that university teaching may lag behind technological developments in industry would be of much less importance.

New educational approaches are essential to meet the complex demands of science and industry. Qualified scientists have been produced by two sharply contrasted methods—the university with its own examinations for internal students, and the so-called self-education system which allows working students to qualify by taking external examinations of universities or professional institutions. Each system has its merits and defects, but little attention has been given to their integration, for which there is a good precedent in medical education. The final recognition by degree or fellowship would not be conferred upon the chemical engineer until the second stage had been completed to the satisfaction of an independent examining body.

Such a plan will probably invite the criticism that most promising young men would be monopolised by the larger employers. That disregards the circumstances that the largest users of chemical engineers are the big groups and the training they can offer has wider scope than is generally available elsewhere. The small units of chemical industry will do well to rely upon the part-time services of consultants.

# Notes and Comments

## Cost of Chemical Transport

THE negotiations which have been taking place in Widnes between some chemical manufacturers and the Road Haulage Executive to consider an increase of haulage rates prompt the question whether this foreshadows a general raising of transport costs. Following the nationalisation of road transport, a national increase of 7½ per cent, to meet budgetary costs, was made last May in the form of a surcharge. Seeking to justify the raising of rates in the North West division, the Road Haulage Executive may possibly plead the facts that existing rates have been proved uneconomical, and that the consignment by certain undertakings of chemicals of a hazardous nature demand a revaluation. A spokesman of the executive stated that other areas would not be affected. It is hard to understand, however, why the transport of similar products—chemicals or anything else—to be economical should require one rate in one part of the country and another elsewhere.

## Student Technologists

THE collaboration of the U.S.A. and Germany during this year in the international student exchange has brought new fields of exceptional interest to technologists within the scope of the scheme which IAESTE has administered with growing success for three years. The welcome extended to the system, of which this country was one of the founders, can be gauged by the continual increase in the numbers of students who have made use of these opportunities to study the technology of other countries—959 in the first year, 1236 in 1949 and last year 1672. The U.S.A., which has not yet operated the scheme for a full year, received only 30 students and sent 37; Germany entertained 178 students and sent abroad 100 of her own. Those figures, however, probably bear little relationship to the scale of exchanges hereafter; Germany, for example, was ready to receive 600 students this year. It is perhaps a good omen that Great Britain continues to be more attractive to foreign students in industry than any other country; 368 came here and 353 of our people studied abroad. Sweden (344) and France (182) were the other "most favoured nations." Not the least useful service of this exchange system, of which the nucleus was formed long ago at the Imperial College, South Kensington, is its power to break down insularity. That is confirmed by the students' own reports, many of which have acknowledged their appreciation of the cultural opportunities. In this country many foreign students have been glad to study at close quarters the tribal customs, as well as the industries, of a people whom the Soviet Press confidently describes as cannibals.

## Naming the Particle

THE recent discovery of a new ultra-atomic particle, the tau-meson, has thrown into relief the almost terrifying complexity of the problems of the scientists engaged in defining this fundamental field, in which firm postulates are a rarity. Nomenclature, the common bugbear of outsiders, is not the least of their problems. The mesotron, originally the particle discovered in cosmic rays in 1936, illustrates this. When, ten years later, another particle was discovered by Powell and co-workers in Bristol, having about one and one-third times the mass of the mesotron and a life only one-hundredth as long, to distinguish between the two particles the term mesotron was prefixed by the Greek letters $\pi$ and $\mu$. The heavier particle became the $\pi$-mesotron, and the lighter particle, the $\mu$-mesotron. Investigation has since shown that the properties of the two are such that they will not fall into the same natural classification. The use of a common generic term is therefore likely to prove

inconvenient and illogical and the subsequent postulation of the tau-mesotron has further complicated the issue. The lesson pointed by this and similar readjustments is that when such particles are " labelled " usually much remains to be discovered about them and any naming that is done is likely to be tentative. This problem has its analogies in the ordinary troubles that beset chemists who are endeavouring to produce order out of chaos in the naming of elements, re-classification of units, and the standardisation of the *p*H scale.

## Significance of Minute Errors

NUCLEAR study has been obliged to invert the normal process of examining experimental data of palpable and reproducible values and producing a law. Those seeking to know more about the inwardness of the atom are liable to find in minute experimental errors, which other branches of science might safely disregard, the evidence on which they can postulate the existence of elusive new entities. If, as is likely, they have a life only to be measured in millionths of a second and a mass which physical sciences, the nuclear scientist may fairly be exonerated if he fails to place them firmly in any familiar perspective. The troubles of the nuclear scientist are manifestly his own business, but they do appear to deserve a moment's sympathy from those who deplore his inability to call a spade a spade—without a Greek qualification.

## France's Chemical Engineers

THE number of chemical engineers a country needs is coming to be recognised as the modern indication of its industrial progressiveness. France's recovery from the injuries of war is reflected by the existence there of an unsatisfied need for chemical engineers which sounds to be as urgent as our own. The evidence of that was given in London this week by the distinguished head of the Ecole Nationale Supérieur de Strasbourg, Professor H. Forestier. Strasbourg and Paris are the two main centres in France of practical training in chemical engineering, and share with Nancy, which is the source of most of the theoretical work, almost exactly the sort of problems facing the Institution of Chemical Engineers and the universities and technological institutes here. Professor Forestier, guest on this occasion of the Institut Français, made it clear that France finds just as refractory as our own the problems of relating chemical engineering to immediate needs without sacrificing inventiveness, and of procuring willing workers of the right calibre. Candidates with higher mathematics, some physics and chemistry are not rarities in either country, but, as the president of the Chemical Engineers (Professor D. M. Newitt) observed, those attainments do not make a man a chemical engineer or even indicate that he has the flair to become an effective one.

## Sitting Down

WORK has its fascination . . . especially for spectators. Contemplation of others hard at their daily tasks is for some a pleasurable and satisfying pursuit. The multitudes which gather round the hole in the road watching the man with the drill have borne witness to this since the days of Macadam. But, like so many of our rapidly diminishing pleasures, the philosophical approach to effort may soon be denied us. A cloud looms over the throng of innocents near the " Road Up " sign. For there is a suggestion that it is possible—perhaps necessary—that laboratory personnel should no longer stand as they labour. In his preface to a recent book on micro-analysis an eminent professor suggested that " it is a very great advantage to have a laboratory specially adapted . . . by the provision of benches . . . at which the analyst can work comfortably *while sitting* " Such dangerous dogma, if allowed to spread, might in time reach the ears of those sturdy excavators of pipes and drains. One can well imagine the result. Sitting down on the job—and no fun for the passer-by.

# DISTRIBUTION OF CHEMICAL ENGINEERS

## *Deficiency Will Not be Less than 15 per cent*

THE nearest approach yet made to a concise statement of the prospective need of industries for qualified chemical engineers forms the most useful contribution of the Chemical Engineers' Sub-Committee of the Technical Personnel Committee of the Ministry of Labour. The main conclusions, particularly that the number trained between now and 1954 would be approximately 1096 and the recruitment required for industries would be not less than 1310, have already been summarised (THE CHEMICAL AGE, *63*, 633).

In its study of the main sources of newly qualified engineers and of the evidence obtained from a number of industries of their probable requirements, the sub-committee acknowledges the likelihood that the latter figure is an under estimate and admits that the field considered does not necessarily cover all the departments in which chemical engineers may be needed.

REQUIREMENTS OF INDUSTRIES

| | Number employed in 1938 | Number employed in 1949 | Number estimated to be employed by 1954 | Average annual rate expansion 1938-1949 | Average annual rate expansion 1949-1954 |
|---|---|---|---|---|---|
| Chemical plant manufacturers | 60 | 239 | 348 | 13% | 8% |
| Chemical industry | 286 | 864 | 1,463 | 11% | 11% |
| Manufacturers of gas appliances | 41 | 78 | 125 | 6% | 10% |
| Gas supply undertakings | 58 | 87 | 105 | 4% | 4% |
| Oil industry | — | 99 | 268 | — | 22% |
| Coal industry | — | 179 | 196 | — | 2% |
| Govt. depts. | 9 | 47 | 76 | 16% | 10% |
| | 454 | 1,593 | 2,581 | *10% | *10% |

* Excluding oil and coal industries.

In the largest single group, the chemical industry—says this section of the report—the number which it is hoped to employ in 1954 represents an increase of very nearly 70 per cent over the 1949 figures. The increase for the sum of the industries concerned is 62 per cent. The 1954 figures will include, of course, as well as expansion properly so called (the emergence of new posts), some vacancies for chemical engineers which are outstanding at the present time, and also appointments which in the past have been held by mechanical engineers or chemists, and which it is policy to fill with chemical engineers as they become vacant.

The average annual rates of expansion have been shown on a basis of compound interest in order to compare the trends over the periods 1938-1949, and 1949-1954. In the industry employing the greatest number of chemical engineers, the chemical industry, there is no difference between the two average annual rates for 1939-1949 and 1949-1954. This also applies to the total figures for all the industrial groups (with the exception of the oil and coal industries for which figures relating to the earlier period are not available).

The total expansion of 988 indicated by the table does not represent the whole of the probable demand in the industries for newly qualifying chemical engineers, because it includes no allowance for replacement of wastage. If we assume, as in the Barlow Report on scientific manpower, that the average professional life of a scientist is 30 years (some members of the sub-committee considered this a considerable overestimate of the average "professional life") one sixth of the number employed in 1949 can be expected to have "wasted" by 1954. This increases the total of estimated openings in the period for new men by a further 265.

### Teaching Demands

After allowing for wastage on this basis, and including additional posts in universities and colleges which the anticipated expansion will necessitate, the total estimated demand for chemical engineers for the coming five years as indicated by the information at the disposal of the sub-committee may be summarised as follows:

| | |
|---|---|
| Chemical plant industry ... | 150 |
| Chemical industry ... ... | 740 |
| Coal ... ... ... ... | 45 |
| Gas ... ... ... ... | 95 |
| Steel ... ... ... ... | 20 |
| Oil ... ... ... ... | 190 |
| Government departments ... | 40 |
| Teaching at universities and technical colleges ... ... | 30 |
| Total ... ... ... ... | 1,310 |

It is seen from the tables that in round figures the estimated supply of professionally qualified chemical engineers amounts at most to 85 per cent of the demand, and that the estimated deficiency is of the order of 200 in the five-years period. This conclusion is in line with experience throughout the post-war years,

during which there has been a steady excess of demand over supply, with no indication that the gap is decreasing.

The supply and demand figures suggest that there is every prospect of the shortage of chemical engineers continuing after the end of the period under review. After careful consideration, however, and especially in view of the outside economic factors that may affect the demand, we do not feel that we would be justified in drawing conclusions about the period following on 1954, or in making recommendations based on the long range extrapolation of present trends.

Nevertheless, it is evident that if the industrial productivity of this country is to be expanded to its maximum extent, the increasing demand for chemical engineers which is already manifest must be satisfied. There would seem, on the facts so far set out in this report, to be a clear need for a greater output from the universities and technical colleges.

# Parliamentary Topics

THE Government's intention to import from Continental sources the quantity of superphosphate fertilisers necessary to make good the deficiency in production here was announced by Mr. G. Bottomley, secretary for overseas trade, in reply to Mr. G. Jeger. Contracts to that end had already been placed.

PARTICIPATION of private firms in the development of atomic energy was the subject of questions by Mr. F. J. Erroll to the Minister of Supply in the House of Commons on Tuesday. The Minister of Supply (Mr. G. R. Strauss) said that although large-scale co-operation was not yet possible, industrial firms were helping in preliminary studies of the feasibility and design of power reactors. The Ministry was in close touch with industry, and every encouragement was being given to the development of industrial applications of radioactive isotopes.

THE whereabouts of Dr. Bruno Pontecorvo was again the subject of a number of Parliamentary questions. No conclusive evidence was obtainable, stated the Minister of Supply, but he had no doubt that Dr. Pontecorvo was in Russia. So far as was known, Dr. Pontecorvo took no documents abroad with him.

DEVELOPMENT of the lead deposits in Lanarkshire was referred to by Lord Dunglass, who asked the Minister of Supply if he would have a survey carried out. Mr. Niall Macpherson stated that he had inquired about these deposits, which extended into Dumfriesshire five years ago. Mr. G. R. Strauss replied that the chief responsibility for producing lead rested with private companies. Lord Dunglass asked the Minister if he was not aware that, owing to present restrictions on development rights, there was little incentive for private companies.

THE purchase of zinc from the Continent at a figure higher than the selling price in this country was the subject of a question by Mr. J. Grimston, who also asked about the allocation of the metal to Royal Ordnance factories. To disclose the price paid was contrary to established practice, answered Mr. G. R. Strauss. The Ordnance factories' demands for defence work would be met in full; for civilian work, allocation would be restricted to 90 per cent of the 1949 intake, the same as commercial manufacturers received.

FORTY-ONE tons of zinc were used by the Royal Mint in the first nine months of this year compared with 150 tons in the 12 months of 1949, stated Mr. Hugh Gaitskell, Chancellor of the Exchequer, in a written answer last week. The present allocation is 11 tons a month.

EXPORTS of copper and copper scrap were prohibited except under licence stated the Minister of Supply. Small quantities of unwrought copper might be exported under licence, but copper alloys in ingot form were restricted to a quota based on 1949 exports. Since September, semi-manufactures of copper had been prohibited except under licence.

GASIFICATION of coal at Newman Spinney was again the subject of questions. The Minister of Fuel and Power (Mr. Philip Noel-Baker) reiterated a statement made earlier that the project had begun well and added that results of the experiment would be assessed at the end of the year when plans for the future would be made.

### Import Concessions Extended

The Board of Trade states that from November 1 Britain's "liberalisation" import concessions will be extended to Switzerland and Liechtenstein. The concessions permit the import without individual licence of a wide range of goods from OEEC and many other soft-currency countries. This decision follows Switzerland's decision to accede to the European Payments Union.

# COMMONWEALTH SURVEY OF FERTILISERS

## *Supplies, Consumption and Prospects*

CERTAIN broad conclusions may fairly be drawn about the future of fertiliser supplies. Taking the world as a whole, reserves of nitrogen in the atmosphere and of phosphate and potash in the earth are adequate to meet all possible increases in demand, but, should consumption rise much more rapidly than at present estimated, the expansion of extraction and processing facilities might be temporarily overtaken. This is stated in "A Survey of the Trade in Fertilisers" (HMSO, 3s. 6d.), which constitutes the 34th report of the Commonwealth Economic Committee.

Consumption has increased and potential demand may rise further, particularly in underdeveloped countries where measures are being undertaken or are in prospect to make good some of the deficiencies in plant foods. Even in those countries in which fertiliser consumption is heavy it is recognised that increased agricultural production would result from heavier or more effective applications. Nevertheless, the price factor cannot be ignored; in a number of European countries, even in 1948-49, farmers in some cases seem to have regarded agricultural prices as an indication that further expenditure on expansion of output would not be sufficiently remunerative.

### Ample Nitrogen and Phosphate

The adequacy of plant food reserves, however, is not the whole picture; short term local deficiencies of particular varieties of fertiliser may occur and there is a shortage of sulphur, which is needed in the preparation of the two most widely used chemical fertilisers, ammonium sulphate and superphosphate. With upwards of three quarters of the world's total supply of chemical nitrogen fixed from the atmosphere, the basic raw material is virtually unlimited and, given adequate fuel or hydro-electric power, any future increase in demand could be met by expansion of productive capacity. Known reserves of phosphate rock are so great that there can be no reasonable expectation, whatever the trend of consumption, of their being exhausted before further beds are discovered and brought into production.

Prospective supplies of potash appear to be ample to meet all predictable requirements. In Europe, the output of Spain, France and Germany appears capable of considerable further expansion and progress is being made in the concentration of potash salts. It is too early yet to say whether the exploratory work in the U.K. and Canada or the recently reported discovery of extensive potash beds in Poland will lead to large-scale production.

### Sulphur Prospects

Of the sulphur problem the report observes that not only has world demand for sulphuric acid for all purposes increased very heavily since before the war but (owing largely to the smaller capital requirements and, often, lower running costs of acid plants based on brimstone as compared with those based on pyrites) the proportion of sulphuric acid made from elemental sulphur has also risen considerably. Adequate supplies of raw sulphur for the operation of additional sulphur-burning plant will not necessarily be available to importing countries and enhanced importance will therefore attach to indigenous supplies of sulphur-bearing minerals (pyrites, galena, zincblende, gypsum, etc.), to the cleaning of smelter and other industrial gases and to methods of concentrating the $P_2O_5$ content of phosphate rock, or making available a greater proportion of the existing $P_2O_5$ fraction, without the use of sulphuric acid; moreover, phosphate is also applied as one of the N-P types of fertiliser in the manufacture of which no sulphur derivatives have been employed.

World consumption of phosphate increased from 1946-47 to 1948-49 as greater supplies of rock became available from North Africa and the Pacific Islands for the manufacture of superphosphate and, in Europe, as war damage was made good in the industry. With the recovery of steel production, more slag and other kinds of phosphate fertilisers became available over this period, but in 1948-49 they contributed only some 20 per cent of the estimated world consumption of $P_2O_5$. The Commonwealth uses about 20 per cent of the world total, a higher proportion than in the case of nitrogen or potash. The most striking change since before the war has been the rise in the U.S. consumption from less than one-

fifth to more than one-third of the world total.

Total trade in phosphate, which (in terms of $P_2O_5$) had fallen by about one quarter during the war, rose rapidly from 1946 to 1948 to reach 18 per cent, and the following year 29 per cent, above the pre-war level. In 1949 the Commonwealth accounted for 36 per cent of total imports, a higher proportion than before the war, but only 16 per cent of total exports as against 20 per cent in 1938.

### Heavy Demand

Estimated world potash consumption jumped in one year from seven to 24 per cent above pre-war; during the following year, 1948-49, there was a further increase to 40 per cent. Europe, the largest producer of potash, is also the largest consumer, taking two-thirds of the world supply in 1948-49; the U.S.A., with nearly 30 per cent, absorbed most of the remainder, consuming nearly all her own production. Use in other parts of the world is low. It is clear that the total potash trade recovered, rapidly after the heavy wartime reduction, and by 1948 was probably not far off the pre-war level, while there was a very substantial advance of perhaps 30 per cent in 1949. Total trade in nitrogen recovered fairly rapidly from the wartime reduction and reached by 1949 some 25 per cent more than in 1938.

The rise in fertiliser prices since the war, while substantial in itself, was considerably less than that of farm products generally. Full data are not available for many countries, but the fertiliser price indices of the U.K., Canada, and the U.S.A. showed increases of 35-50 per cent as compared with 120-200 per cent for farm products. In Denmark, where the wartime interruption of imports had caused an acute shortage of fertilisers, there was an increase of 90 per cent in fertiliser prices and of only 115 per cent for farm products.

Dealing with the net fertiliser trade position of the Commonwealth countries, the report draws attention to the fact that broadly speaking the Commonwealth as a whole is a net exporter of nitrogen, but an importer of phosphate and potash. In 1948-49 only two countries, the U.K. and Canada, exported nitrogen in significant quantities; India was the largest importer, followed by the Colonial Empire. The total value of fertiliser imports in 1948 into Commonwealth countries other than the Colonial Empire was £26.8 million, and of exports £17.9 million.

**PRODUCTION ESTIMATES**
(World totals in all cases exclude the U.S.S.R.)

NITROGEN
(thousand tons N)

| Region | 1938-39 | 1946-47 | 1947-48 | 1948-49 |
|---|---|---|---|---|
| Europe ... ... | 1,630 | 1,056 | 1,305 | 1,517 |
| North and Central America ... ... | 285 | 837 | 1,050 | 1,133 |
| South America ... | 240 | 277 | 289 | 294 |
| Asia ... ... ... | 367 | 169 | 220 | 304 |
| Oceania ... ... | 5 | 5 | 7 | 11 |
| World total ... | 2,528 | 2,344 | 2,872 | 3,259 |
| of which Commonwealth ... ... | 181 | 409 | 426 | 472 |

MANUFACTURED PHOSPHATE
(thousand tons $P_2O_5$)

| Region | 1938 | 1946-47 | 1947-48 | 1948-49 |
|---|---|---|---|---|
| Europe ... ... | 2,126 | 1,577 | 1,969 | 2,334 |
| North and Central America ... ... | 639 | 1,722 | 1,950 | 1,957 |
| South America ... | 32 | 43 | 43 | 41 |
| Asia ... ... ... | 305 | 74 | 146 | 174 |
| Africa ... ... | 44 | 82 | 88 | 107 |
| Oceania ... ... | 351 | 357 | 386 | 436 |
| World total ... | 3,498 | 3,855 | 4,582 | 5,049 |
| of which Commonwealth ... ... | 508 | 795 | 866 | 935 |

POTASH
(thousand tons $K_2O$)

| Region | 1938 | 1946-47 | 1947-48 | 1948-49 |
|---|---|---|---|---|
| Europe ... ... | 2,429 | 1,487 | 1,865 | 2,243 |
| North and Central America ... ... | 283 | 800 | 852 | 950 |
| South America ... | 10 | 10 | 10 | 5 |
| Asia, Africa and Oceania ... ... | 33 | 42 | 32 | 1 |
| World total ... | 2,755 | 2,339 | 2,759 | 3,199 |
| of which Commonwealth ... ... | — | 2 | 1 | 1 |

ESTIMATED U.K. FUTURE CONSUMPTION
(thousand tons)

| | 1950-51 | 1951-52 | 1952-53 | 1953-54 | 1954-55 | 1955-56 |
|---|---|---|---|---|---|---|
| N | 200 | 200 | 210 | 220 | 230 | 240 |
| $P_2O_5$ | 450 | 450 | 460 | 470 | 480 | 490 |
| $K_2O$ | 200 | 200 | 205 | 210 | 215 | 220 |

**ESTIMATED CONSUMPTION**
(thousand tons plant food)

| Region | 1936-38 Average | | | 1946-47 | | | 1947-48 | | | 1948-49 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | $P_2O_5$ | $K_2O$ | N | $P_2O_5$ | $K_2O$ | N | $P_2O_5$ | $K_2O$ | N | $P_2O_5$ | $K_2O$ |
| Europe ... ... ... | 1,277 | 2,011 | 1,742 | 1,189 | 1,594 | 1,530 | 1,437 | 1,980 | 1,895 | 1,470 | 2,239 | 1,991 |
| North and Central America | 374 | 703 | 410 | 741 | 1,647 | 826 | 832 | 1,760 | 877 | 956 | 1,863 | 987 |
| South America ... | 31 | 22 | 10 | 46 | 73 | 14 | 47 | 77 | 17 | 53 | 71 | 23 |
| Asia ... ... ... | 463 | 297 | 116 | 325 | 130 | 66 | 475 | 176 | 23 | 489 | 237 | 189 |
| Africa ... ... ... | 86 | 74 | 11 | 50 | 88 | 23 | 69 | 96 | 26 | 91 | 111 | 31 |
| Oceania ... ... ... | 17 | 345 | 15 | 11 | 357 | 9 | 14 | 386 | 10 | 15 | 452 | 8 |
| World total ... ... | 2,248 | 3,452 | 2,304 | 2,362 | 3,889 | 2,468 | 2,874 | 4,475 | 2,848 | 3,074 | 4,973 | 3,229 |
| of which Commonwealth | 112 | 580 | 124 | 250 | 800 | 189 | 294 | 885 | 259 | 323 | 999 | 277 |

# ROAD HAULAGE RATES

## *Chemical Manufacturers Discuss Increases*

HAULAGE rates increases have been discussed at a meeting of representatives of the Road Haulage Executive and certain chemical manufacturers in Widnes. The latter were told that they would be invited to negotiate rates only for certain named chemical manufacturers, while other firms would be excluded from the result of such negotiation.

Mr. E. N. Wainwright stated at the meeting of the Transport Committee of Liverpool Chamber of Commerce that he was concerned to hear that Widnes manufacturers might be agreeing to rate increases and he inquired whether British Road Services could justify an application for higher rates. He hoped that any firm would refuse to agree to any increase in rates unless sufficient evidence was produced to justify it.

Mr. Palim, district manager of the Road Haulage Executive (N.W. Division), said British Road Services were convinced that an examination of all those rates which they had taken over from the private companies must take place. If it was found that any rate could not be operated economically, then it became essential for the executive to discuss an increase in those rates with the individual traders.

Mr. Wainwright replied that it was understood that the British Transport Commission would go before the Transport Tribunal, possibly in two years' time, with a demand for an up-grading of road haulage rates. If traders had already accepted an increase in rates it would undermine the opposition to the Transport Commission's demand.

It seemed an attempt was being made to subsidise British Railways and it did not appear traders were now receiving a service which could be compared with that given by private enterprise prior to nationalisation.

# *Train Fire: Cellulose Paint is Exonerated*

PAINT containing cellulose nitrate used in the coaches was not considered to be the cause of the train fire at Beattock on June 8. This was stated by the Parliamentary Secretary of the Ministry of Transport (Lord Lucas of Chilworth) in reply to questions in the House of Lords last week.

The paint was of a different kind from that associated with the Penmanshiel fire, and it was not thought it had contributed to the loss of life, although it might possibly have had some slight effect on the subsequent conflagration.

The investigating officer of railways had now completed his inquiries. One difficulty had been that no witness had survived, and the two coaches concerned were so completely gutted that little evidence remained to show how the fire started.

There was little doubt, however, that the fire was caused by a cigarette or carelessly discarded match in a compartment, which was afterwards unoccupied. The cause of death was the sudden inrush of a wave of intense heat into the compartment occupied by the victims.

It was hoped that the investigating officer's report would be published before the end of the year. The Government was taking all steps to see that its recommendations were implemented to prevent future occurrences.

## Fatal Explosion

AN explosion on Monday in one of the mixing houses for mining explosives of Explosives and Chemical Products, Ltd., at Bramble Island, near Harwich, resulted in the death of three men working in the 50 ft. building, which was entirely demolished, and the disappearance of another male worker. Twenty-five men, women and girls were reported to have been injured. The blast is stated to have smashed windows 12 miles away.

Work has been suspended and the company is to hold an inquiry.

## Importance of Scientific Films

THE production of films illustrating the contributions of science to human well-being, through medicine, agriculture and nuclear physics, was urged at the recent fourth annual congress, in Florence, of the International Scientific Film Association. Great Britain was represented by 10 delegates, including representatives of the Scientific Film Association of Great Britain, the British Council and the Royal Photographic Society, and contributed about 30 per cent of the total of 120 films screened.

## RESEARCH CENTRE CLOSED

### *Sudden Decision by Powell Duffryn*

THE abrupt closing of the Powell Duffryn research laboratories in Battersea Park Road, London, S.W., was the subject of action on Monday by the Association of Scientific Workers. It asked that a deputation should be received by the company, following the receipt during the week-end by some 50 scientific and technical workers and about 100 other employees of registered letters informing them that they were "denied access."

Sir Herbert Merrett, the newly elected chairman of Powell Duffryn, Ltd., in a statement to the Press, said: "In view of the fact that the Hayes factory of the company's wholly-owned subsidiary Powell Duffryn Carbon Products, Ltd., is now in active commercial production, the board of Powell Duffryn has decided in the interests of greater efficiency that the time has come when all necessary research and development work to support the expansion of the important carbon business should be transferred from the Battersea laboratories and consolidated at Hayes.

"In order to ensure that this reorganisation took the most appropriate form, the board decided to set up a reorganisation committee to make immediate recommendations for the future distribution of the work. In order to facilitate the work of this committee, it was decided that the Battersea laboratories' staff should be given temporary leave of absence on full pay."

## More Fatal Accidents

DEATHS from industrial accidents in the United Kingdom in September were nearly two-thirds as large as in August. The total was 232, compared with revised figures of 140 for the previous month and 107 for September, 1949. (*Ministry of Labour Gazette*, Vol. 58, No. 10).

Only six fatal accidents were associated with the chemicals, oils, soap and allied industries. Metal conversion and founding accounted for nine, metal extracting and refining, two, and other metal trades, one. There were two deaths in the clay, stone, cement, pottery and glass group, and two in gas works.

No deaths were recorded in the U.K. in September under the Factories Act, 1937, or under the Lead Paint (Protection against Poisoning) Act, 1926.

## U.S. TO CONTROL SULPHUR

### *Statutory Restriction of Exports?*

ALTHOUGH U.S. sulphur production for 1950 is expected to reach a peak level of 5.2 million tons, 1951 will see the imposition of export controls on the element, according to Washington officials —states our New York correspondent. After this year, it is pointed out, the nation's raw sulphur deposits will gradually decline and production in 1951 is not expected to exceed 4.9 million tons.

In view of the possibility that export controls will operate during the first quarter of 1951, ECA officials are encouraging foreign countries to start purchasing pyrites from European sources to reduce their dependence on U.S. elemental sulphur. It is recognised that European countries are reluctant to make the change from U.S. elemental sulphur to the more expensive pyrites; Europe's facilities are set up to use sulphur rather than pyrites and it will take time and money to convert them.

It seems likely, however, that European consumers will have no choice but to switch to pyrites.

Controls are also considered necessary to keep domestic sulphur available for American defence needs. Efforts will also be made to develop U.S. domestic pyrites and recover sulphur from gases and ores.

## 748 More Pharmacists

THE number of pharmaceutical research scholarships may, before long, be substantially increased, Mr. C. W. Maplethorpe, chairman of the Pharmaceutical Society's education committee, stated in the course of an address on the society's education policy. There are already three such scholarships of the annual value of £300 each.

A lease of a building has been taken for the establishment of a well-equipped laboratory for work in connection with the society's scientific publications.

Because of the new opportunities in pharmacy, said the chairman of the education committee, more young people were entering the profession. Since January they numbered 748, and, if the entries during the remainder of the year were at the same rate as last year, they would exceed the entry figures for any year since 1933. Thirty-five women and 90 men qualified at the society's September examinations.

# FIRE HAZARDS IN PLASTICS INDUSTRY

## *Dust Explosion the Greatest Risk**

PLASTICS, except nitrocellulose, have a low order of combustibility and none of them presents any greater fire hazard than wood, paper or other ordinary combustible material—many of them much less than wood—and some have, in fact, flame-proofing qualities. However, being organic substances, all synthetic resins and plastics, given favourable conditions, will burn.

Their burning characteristics, as of any other combustible material, depend on the physical form of the material. Finely divided material burns rapidly. When plastics are in the form of dust in suspension in air there is always the possibility of a dust explosion—just as there is with the dusts of starch, sugar, grain, coal, etc.

All sources of information seem to agree that the dust explosion hazard is greater than the fire hazard. The few incidents recorded within the plastics industry of which details have been made available have generally occurred as the result of the ignition of dust. This hazard exists principally in the premises of the manufacturer of synthetic resins and moulding compounds (mostly the larger organisations) and to a less extent in the premises of plastics moulders and fabricators.

Few synthetic resins in their pure state possess all the desired physical properties.

### Fillers and Flammability

By varying the amounts and combinations of other ingredients—fillers, pigments, plasticisers, lubricants and solvents—the manufacturer may modify the properties of a plastic, including, to some extent, its combustion characteristics. For example, certain fillers, consisting of mineral substances such as asbestos, mica and diatomaceous earth, would definitely reduce the flammability. Some plasticisers may increase flammability slightly, while others, such as certain phosphates will definitely act as fire retardants.

Thus, by far the greater potential hazards of the plastics industry are in the primary manufacture and are centred around the handling of combustible dusts and flammable liquids.

The possibility of generating of explosive dusts is inherent in the crushing, grinding and pulverising in the progressive size-reduction of the original synthesised resin and in the subsequent compounding with fillers and pigments. As in many other industries involving organic dusts, this dust hazard can be controlled by the adoption of safe practices and operating conditions. These include:

1. The provision and maintenance of completely dust-tight equipment.
2. Adequate dust collecting systems.
3. Conformity with the recognised standards for electrical equipment and systems in hazardous locations.
4. Magnetic separators for removal of tramp iron.
5. Proper grounding arrangements to prevent the accumulation of static electricity.
6. Inert gas protection in all grinding equipment and conveyor systems.
7. Explosion reliefs to prevent extensive damage to equipment and building.
8. Automatic sprinkler protection.

Most of these preventative and precautionary measures apply also to the flammable liquid hazards.

With the passing of the plastic moulding powders and sheeting, rod, tubes, etc., to the fabricators, the fire hazards very definitely decrease in severity.

* An abstract of a paper read at the Fire Protection Conference held at the 79th annual general meeting in Toronto of the Canadian Manufacturers' Association, Inc.

## Principles of Dust Collection

THE fundamental mechanism of filters and spray de-dusters was discussed by Mr. C. J. Stairmand in a paper on "Dust Collection by Impingement and Diffusion," given at the recent inaugural meeting, at Birmingham University, of the Midlands branch of the Institution of Chemical Engineers.

The mechanism of impingement filtration intended to measure a dust-laden air stream flowing round an obstacle was stated to be a function of the non-dimensional group $\frac{Dg}{Vf}$. The application of the $Vg/Df$ concept—

where $D$ = Diameter of obstacle
$g$ = Gravitational constant
$V$ = Velocity of approach
$f$ = Free falling speed of the particle

} in any self-consistent system of units

—was applied to spray tower performance. It was shown that the maximum efficiency for the smaller dust particles occurs for droplet sizes of about 800 microns and that, except for the very finest dust particles, the efficiency varies little over the range of drop sizes 500-1000 microns.

# PHOTOGRAPHY OF ATOMIC PARTICLES

## *Development of Highly Sensitive Materials*

From A CORRESPONDENT

FORTY years ago, scientists succeeded for the first time in photographing the tracks of alpha particles on photographic plates. The plates then in use, however, were relatively inefficient and for many years the photographic method was not regarded as very reliable and was restricted to a limited range of investigations. The development of nuclear track emulsions has now overcome these limitations, and has made photography one of the most valuable methods of detection employed in nuclear physics. Photographic materials are now capable of recording the path of charged particles of any energy.

The potentialities of autoradiography, too, have been enormously increased since the war by the introduction of radioisotopes and an emulsion with a very high resolving power, allowing high magnification.

### First Developments

The first considerable advance in the photographic recording of particle tracks was a plate produced by Ilford, Ltd., at the suggestion of Professor Powell, of Bristol University, who has been closely identified with the application of the photographic method to nuclear research. This plate had five grains, a high concentration of silver, and was thickly coated with a very small proportion of fog grains (or grain spontaneously developable). It clearly indicated the physical properties necessary, but some of the interesting particles could not be recorded because the grains were not sensitive enough. The Kodak laboratories were responsible for developing the still more sensitive emulsions subsequently produced in Britain.

Three types of nuclear track plates are now supplied by Kodak, Ltd. The first is known as NT-1a, and is intended primarily for the recording of alpha and other particles of high ionising power when particles of lower ionising power, such as protons, or electrons released by gamma rays, would give an obtrusive background if emulsions of higher senstivity were used. Tracks of alpha particles in these emulsions can be easily distinguished from those of protons.

The second type, NT-2a, is of higher sensitivity and is intended for the recording of particles of medium ionising power, such as high-energy alpha particles, protons and deuterons of moderately high energy.

When first developed the emulsion was tested for proton sensitivity by bombardment with neutrons from a radium-beryllium source. A 17 cm. thickness of lead was interposed between the plates and the source to diminish the gamma-ray intensity incident on the sensitive material.

Microscopical examination of the plates after processing showed that the background to the proton tracks was of a much more heterogeneous nature than that obtained by exposure to a pure alpha-ray emitter, such as polonium. Under high magnification, this heterogeneous background was found to consist of numerous fairly short, highly curved chains of developed grains. These were believed to be the low energy ends of tracks caused by photo-electrons and recoil electrons liberated by gamma-rays. Further investigation showed that the NT-2a was the first emulsion on which electron tracks could be recognised with certainty.

The NT-2a plate was introduced in 1948 and has recently been improved in two respects. Latent image stability has been considerably enhanced, and the grain diameter is now of the order of 0.2-0.3 microns. Scanning and grain counting are easier.

### Deficiencies of NT-2a Plates

The NT-2a plates were, however, only sensitive enough to record the tracks of electrons with energies of up to 80 keV., the residual path-length in the emulsion of an electron of 80 keV. being about 30$\mu$. A singly charged particle, with a velocity of the order of 90 per cent that of light, has the lowest ionising power possible. The energy of an electron with this minimum ionising power is between 500 and 1000 keV., and its residual path-length in the emulsion will be between 800 and 2000, assuming that the emulsion has a stopping power of 2000 to the electrons. Because the ionising power of an 80 keV electron is approximately three times the minimum, an emulsion with a triple increase in sensitivity over that of NT-2a was required to record tracks of particles of minimum ionising power with any certainty.

This increase of sensitivity was achieved

Much of the information in this article was obtained in the course of a visit to the research laboratories of Kodak, Ltd.

in a new plate known as NT-4, which spontaneously records the tracks of cosmic ray particles. It has to be used very soon after manufacture, because tracks tend to accumulate in the plates from cosmic radiation and also from the natural radioactive contamination of the atmosphere.

The NT-4 emulsion was the first to compete in sensitivity with the Wilson cloud-chamber and its introduction has already resulted in the observation of new phenomena in cosmic ray investigations, where the highly energised particles involved have too low an ionising power to be recorded on slower plates. It has enabled the decay of $\mu$-mesons to be seen for the first time and its use has provided more evidence for particles of mass 1000me. It has also been responsible for the observation of new phenomena such as the production of showers of penetrating particles in cosmic ray stars.

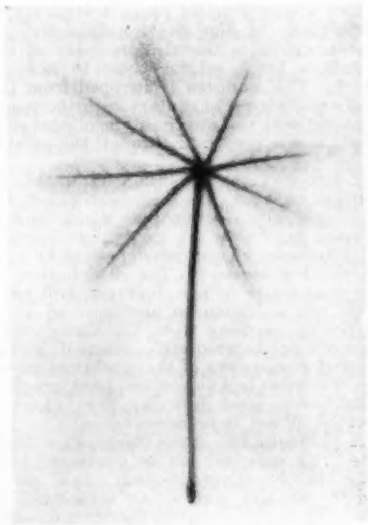
High energy protons have been known previously to disappear and at the same time to produce an electron and a positron. These pairs have been clearly observed in NT-4 plates exposed to high-energy protons. Photographs have also been taken of two colliding particles and the release of electrons during the process of radioactive decay. This is difficult to observe in a Wilson cloud-chamber but the photographic plate records the complete sequence of emissions of particles during the time of exposure.

Nuclear track plates are supplied to large research institutes, hospitals, etc., both in Britain and other countries. They are being used for a variety of industrial purposes, besides contributing in many directions to greater understanding of the composition of matter. It is also possible that investigation of the way in which they work may help to make clear the mechanism of photography, particularly in regard to the formation of the latent image.

### Autoradiography

The potential uses of emulsions similar to those used in nuclear track plates in biology and medicine have not yet been fully realised. These emulsions afford, for example, a valuable means of tracing the paths of radioactive isotopes by the method known as autoradiography.

It is now possible for a doctor to know the destinations in the body of his patient of particular elements incorporated in a drug. Injected iodine goes to the thyroid. This can be confirmed by injecting an animal, such as a rat, with radioactive iodine. A microscopic section of the rat's thyroid is then placed on a glass slide in intimate contact with an autoradiographic plate. The areas of isotope deposition are indicated by the blackening of the film, enabling the distribution of iodine in the specimen to be clearly seen.



*Autoradiography of lupin leaf showing distribution of radioactive phosphorus*

This technique can be used to study the path of any element in animals, plants or metal alloys. A simple example is provided by an experiment on a lupin leaf. The stem of this leaf was placed for a few hours in a weak aqueous solution of radioactive phosphorus. The plant was then brought into contact with a fast X-ray film for a one-day exposure. The radioactive phosporus decayed with the emission of high-speed electrons, and caused ionisation of some of the silver halide grains of the emulsion. After processing, the autoradiograph revealed the distribution of the radioactive phosphorus within the stem and leaf, showing that the phosphorus was concentrated into the stem and veins.

Nuclear track emulsions are characterised by minuteness, high intrinsic sensitivity and close packing of the grains. They are very suitable for the autoradiography of microsections, because they provide high resolution combined with high sensitivity to charged atomic particles. Because of the divergence of charged particles from the point of origin in the specimen, good resolution can only be obtained if the emulsion layer is very thin. An autoradiographic stripping plate has been developed

which allows a useful magnification up to 1000 times of the image produced. A characteristic is the reinforcement of the emulsion by a gelatin layer 10 microns thick. The emulsion is stripped from the plate and placed in contact with the specimen without the interposition of any support, and is processed through the gelatin layer.

Up to now the resolution obtainable in autoradiographs has been estimated by the sharpness obtainable when photographic emulsions are exposed in contact with radioactive isotopes deposited by biochemical processes. The distribution of the radioactive isitope, however, will vary from one specimen to another and even successive sections from the same specimen will not be absolutely identical. Hence a strict comparison of the resolution given by different techniques or photographic emulsions is most difficult. The following method of test is more promising.

A photographic silver image on a very fine grain material can be converted successively to silver bromide and silver iodide and still give a line separation of 0.5$\mu$. These reactions can therefore be used to give a deposit of an iodine isotope with any required distribution, thus forming a radioactive test chart.

Such charts are made by applying about 0.01 c.c. of a solution of $I^{131}$, to an area 2 mm. × 2 mm. of the emulsion surface containing a test image previously converted to silver bromide. After washing and drying, a 4-$\mu$ thick coating of the emulsion to be tested is transferred to the surface of the test chart. After the "exposure," the emulsion-coated test chart is soaked in water for a few minutes and the emulsion layer processed in the stripped condition.

In one example studied, the original test chart image represented line separations respectively of 4.5$\mu$, 3.7$\mu$, 3.0$\mu$, 2.0$\mu$ and 1.7$\mu$. It was apparent that in the original autoradiograph useful resolution was obtained with 2.5$\mu$ and possibly with 2.0$\mu$ separation, but not with 1.7$\mu$.

It is considered that these test charts could be used for systematic estimation of the relative importance of the various emulsions and geometrical factors influencing the resolution of autoradiographs. They might also be used for comparing the effects of electrons of varying energy given by different isotopes. Another possibility is the production of test charts made from micro-photographic replicas of tissue sections to help in the preparation of autoradiographs made from biological material.

## Growth of "Nucleonics"

EIGHTY-FOUR American manufacturers are producing 180 different kinds of instruments to detect radiation, according to a catalogue issued by the United States Atomic Energy Commission. These are serving to protect the health and safety of workers in atomic energy plants, for nuclear research, for finding and testing radioactive ores, and for all types of experiments involving radio-isotopes.

The total reflects a constant growth in the past five years. In 1947, there were only nine companies, producing 19 different kinds of instruments. By 1948 there were 67 companies producing 102 instruments.

This growth has been encouraged by the Commission, which has sponsored under contract the industrial engineering of numerous types of detection instruments developed in Government laboratories during and since the war. Recently, a number of new types of instruments developed independently have come on the market. The Commission's new catalogue lists 32 instruments capable of measuring and distinguishing between alpha, beta and gamma radiation. In last year's catalogue only 13 instruments were listed.

## First Training Reactor

THE first nuclear reactor in the United States not owned and operated by the Atomic Energy Commission will be built at the North Carolina State College at Raleigh, using fuel loaned by the AEC to provide facilities for nuclear engineering research and education. It will be a low-power reactor (maximum 10 kilowatts) using enriched fuel containing not more than 1 kg. of fissionable uranium 235.

The reactor will be a "water boiler" type, similar to that at the Los Alamos Scientific Laboratory, in which the fuel is a solution of uranium salt in water.

The use of the reactor will be determined by the college itself. Plutonium produced will total less than a gram a year. Some 60 undergraduate and graduate students in nuclear engineering are enrolled at the college. Efforts will be made to develop practical means of using the heat incidentally generated.

### Oil Vapour Fire

Flames from oil vapour which ignited in the laboratory at the Middlesbrough works of Sadler & Co., Ltd., last week, were extinguished before serious damage was caused.

# SUPERCONDUCTIVITY AND NUCLEAR MASS

## *Direct Relationship Established in U.S. Laboratories*

RECENT low-temperature experiments at the U.S. Bureau of Standards have resulted in the discovery of a new and unexpected relationship between superconductivity and the constitution of the atomic nucleus. Notes on these experiments in the *Journal of the Franklin Institute* (250, 4, 358) indicate that the atomic nucleus must exert an important effect upon the superconducting properties of the material.

It was found that the pure mercury isotope 198 becomes superconducting at a temperature about 0.02° K higher than does natural mercury—which is largely a mixture of five different isotopes having an average atomic weight of 200.6. This shift is proportionately quite large for a temperature so near to absolute zero and, because the difference between the isotopes depends only on their nuclear masses, the results indicated a direct relation between nuclear mass and superconductivity.

### Explanation Sought

Hitherto it has been generally supposed that superconductivity was concerned exclusively with the properties of the electronic configuration outside of the nucleus. The results obtained at the Bureau, together with an independent discovery of the same phenomenon in other mercury isotopes at Rutgers University, have, however, definitely established the validity of the nuclear effect.

Because there has been no adequate theoretical explanation of superconductivity the National Bureau of Standards is now making studies to seek a more complete explanation of this and other low-temperature phenomena. In the course of the studies it was suggested that the transition temperatures at which different isotopes of the same element become superconducting should be investigated to determine whether the mass of the atomic nucleus has any effect on this temperature.

The transition temperatures of the mercury samples were not measured directly but, instead, the critical field was measured as a function of temperature in the neighbourhood of the normal, or zero-field, transition temperature. Then, by extrapolating to the zero field, the normal transition temperature was accurately determined.

In measuring the critical field, use was made of the Meissner effect, or zero induction property (which prevents the existence of a magnetic field). The superconductor, a long needle of mercury sealed in a thin capillary tube, was placed inside a pick-up coil and both were immersed in liquid helium within a Dewar flask surrounded by liquid air. The pick-up coil was then connected to a ballistic galvanometer.

The critical field for a given temperature was then found by slowly increasing the current in a set of Helmholtz coils surrounding the liquid air bath. When the critical field was reached the specimen suddenly lost its superconductivity and was penetrated by the magnetic field of the Helmholtz coils. The resulting change in flux linkages in the pick-up coil induced a voltage, recorded by the galvanometer.

By varying the pressure within the Dewar flask of liquid helium, the temperature of the specimen was controlled in the range between 1.5° and 4.2° K with relative ease. The experiment was repeated at a number of different temperatures, and the critical field was determined for each temperature. The critical field was then plotted against temperature, and the resulting curve was used to determine the transition temperature of the material under study. In this way it was found that pure $Hg^{198}$ has a zero-field transition temperature of 4.177° K as compared with 4.156° K for natural mercury.

### No Gold Contamination

Experiments were then carried out to confirm that the observed effect was not due to chemical impurities in the mercury. It had been prepared by bombarding gold with neutrons and there was some possibility of residual gold contamination. At another stage 0.1 per cent of gold was added to some natural mercury and the critical field curve of this material was determined. It was found that there was, in fact, no difference between the curve for pure natural mercury and that for mercury with added gold. Gold contamination, if present in $Hg^{198}$, was, therefore, unimportant.

Since the initial discovery of the isotope effect in the superconductivity of mercury, a sample of tin consisting principally of $Sn^{124}$ has been investigated at the Bureau and found to exhibit a similar shift in transition temperature.

# CRITICAL STUDIES OF NEW INSECTICIDES

## *Colonial Research Progress*

PROGRESS in research of many kinds is comprehensively reviewed in *Colonial Research* 1949-50, published by HMSO.*

The third annual report of the Colonial Insecticides, Fungicides and Herbicides Committee under the chairmanship of Professor P. A. Buxton, who succeeded Sir Ian Heilbron in August, 1949, gives a detailed review of the research work.

A team of one chemist and two entomologists at Porton, near Salisbury, investigated the aqueous suspension of insecticides and the formation and properties of DDT crystals. The results obtained are regarded as being of important critical significance and should lead to the production of more effective and economical insecticide formulations.

### Compound 497

Other studies included the chemical and physical properties and the initial and residual contact toxicities of a number of insecticides. That with most insecticidal activity is Compound 497. This has an initial toxicity of the same order as that of the gamma isomer of benzene hexachloride, but is more persistent.

A detailed study of miscible oil formulations was made, so that such components as solvents, emulsifiers, stabilisers and adhesives of a wide variety of types could be tested in preparation for work upon the effects of the various constituents of emulsions on their effectiveness and residual action under varying conditions.

The report notes that the standing of natural pyrethrum had undergone a considerable change during the past year. The insecticidal value of the pyrethrum flowers is due to the presence of two constituents, pyrethrin I and pyrethrin II. These are not homogeneous as was first shown by La Forge and Barthel, and the other constituent was designated cinerin I and II.

Recently in a laboratory of the United States Department of Agriculture an ester closely related to cinerin I had been synthesised. It was now being produced on a commercial scale and its insecticidal properties were under investigation.

While the original estimate of its value was undoubtedly too optimistic, the report observes, there would appear to be little doubt that it, or some other closely related synthetic product would, in due course, prove to be a serious competitor to the natural insecticide. Working under Dr. S. H. Harper's supervision at King's College, Miss N. W. Lowe had prepared a number of standard extracts of the pyrethrins for spectrographic assay with the object of devising a new method of analysis. These samples were being studied.

The East African Tsetse and Trypanosomiasis Research and Reclamation Organisation is embarking upon a new programme of tsetse research, making use of methods recently evolved.

The visits of two representatives of the United States Economic Corporation Administration to East and West Africa during the year had produced a number of useful proposals for additional research with dollar assistance.

A number of experiments had been carried out with Antrycide, chiefly with the object of discovering its prophylactic value. It was not yet possible to evaluate these results, but the difficulties in the way of prophylactic application must of necessity be great, and it was important that they should not be allowed to obscure the great potential value of further research into its curative properties.

### Collated Information

During the year 40 correspondents with the Water Pollution Research Laboratory (DSIR) had been nominated by Colonial Governments. As a result, the number of requests for information and assistance received by the laboratory from Colonial territories had greatly increased. Inquiries had been received on a wide range of problems, including the treatment of difficult waters for supply, the treatment of trade waters, and the prevention of pollution of rivers. Much interesting information on the conditions of water supply and waste disposal had also been received.

Altogether 76 new research schemes and 67 supplementary schemes were made during the year and £1,814,124 was allocated out of Colonial development and welfare funds, bringing the cumulative allocation since 1942 to £7,727,979.

Of the total allocations the main percentage distributions were: 32.5 for agricultural, veterinary and forestry schemes; 14.4 medical research; 7.6 tsetse and trypanosomiasis; 6.5 insecticides; 4.1 anti-locust.

* Cmd 8063 3s. 6d.

# HIGH-EFFICIENCY VACUUM METHOD

## *Simple and Effective Concentration of Aqueous Solutions*

by Dr. M. A. PHILLIPS, F.R.I.C., A.M.I.Chem.E.

THE effectiveness and some other important advantages of vacuum concentration for the relatively numerous occasions when it is necessary to concentrate thermolabile aqueous materials deserve more attention than they receive. When freeze-drying or spray-drying are impracticable the cheap and simple plant required for vacuum concentration has much to recommend it.

Freeze-drying is expensive both in capital outlay and in running. That is perhaps one reason why some forms of penicillin are now obtained by high vacuum concentration of aqueous solutions in place of the older and, according to some workers, obsolescent, freeze-drying.

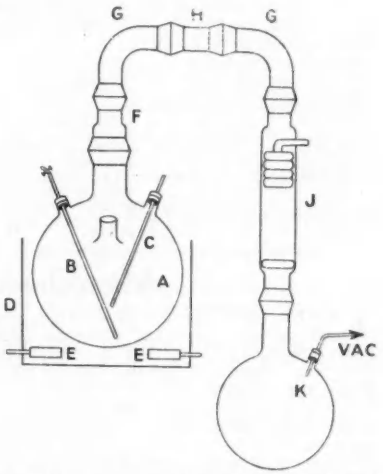
The general principles of design of a still for the rapid concentration of aqueous solutions at low temperatures using reduced pressure are well known. These include the use of wide diameter still heads, good pumps, well-designed condensers, etc., and, if the physcal constants of the solution to be concentrated are known, the design can be calculated. It often happens, however, that the constants are not known and also that there may be other factors which cause performance to lag behind the theoretical.

The following description of a practical experiment in low temperature vacuum concentration may be of assistance to other workers who have similar problems.

### All-Glass Plant

The all-glass apparatus consisted of a 50-l. Quickfit and Quartz standard flask fitted at its 4 in. neck with a 4 in. to 3 in. adapter and thence to a vapour lead made from two 3 in. right-angled bends and short 3 in. diameter extension piece. These in turn were connected to a standard Quickfit and Quartz glass condenser of 3 in. diameter (type HEC 422/3/4) with cooling surface of 3 sq. ft.

The lower end of the condenser led to a 20-l. flask as receiver. This had a 3 in. neck, but earlier experiments using a reducing adapter and fitting the condenser to a 1½ in. neck showed that the reduction of diameter at this point had no effect on the efficiency of distillation—as was to be expected if condensation was adequate. The need for wide diameters is, of course, in the vapour lines.




*Low temperature vacuum apparatus: A 50-l. flask; B bubbler; C thermometer; D water bath; E immersion heaters; F adapter 4 in. to 3 in.; G right-angle bends 3 in.; H extension piece 6 in.; J condenser, type 422-3-4; K receiver, 20-l flask*

As a vacuum gauge, a simple "pull-up" type of mercury column was used; if in the reservoir of this gauge is placed a little syrupy phosphoric acid (0.5 cm. depth) the mercury is protected from oxidation and other contamination for a considerable period. The still was fitted with the usual bubbler tube and with a dipping thermometer and vacuum was applied by a standard Edwards 4-jet water pump fed from high-pressure water mains.

The water bath was heated by two or three immersion heaters, each of 1.5 kW loading; an Isomantle in place of the bath and immersion heaters would have been very convenient if controlled by a Simmerstat.

The following observations were made:

*Liquid used*: 5 per cent solution of a sodium salt of a common organic acid, 25 l. volume.

| | |
|---|---|
| Condenser water in at ... ... | 15° C. |
| Condenser water out at ... | 25° C. |
| Condenser water, rate of flow ... | 60 gal. per hour. |

(*continued overleaf*)

| | |
|---|---|
| Internal temperature of distilling liquid ... ... ... ... | 30° C. to 32° C. |
| Water bath temperature ... | 65° C. |
| Water pump, rate of water flow | 180 gal. per hour. |
| Vacuum ... ... ... ... | 15 mm. Hg. absolute. |
| Rate of distillation—at beginning | 5 l. per hour. |
| at end ... | 3.5 l. per hour. |
| mean ... | 4.25 l. per hour. |
| Temperature of condensed distillate ... ... ... ... | 16° C. |

The temperature of the water bath was then raised to 90° C. and the following observations were made:—

| | |
|---|---|
| Condenser water in at ... ... | 16° C. |
| Condenser water out at ... | 23° C. |
| Condenser water, rate of flow ... | 80 gal. per hour. |
| Internal temperature of distilling liquid ... ... ... ... | 30° C. to 32° C. |
| Water bath temperature ... | 90° C. |
| Water pump, rate of flow ... | 180 gal. per hour. |
| Vacuum ... ... ... ... | 15 mm. Hg. absolute. |
| Rate of distillation—at beginning | 6.4 l. per hour. |
| at end ... | 5.4 l. per hour. |
| mean ... | 5.7 l. per hour. |
| Temperature of condensed distillate ... ... ... ... | 17.5° C. |

Refrigeration of the receiver by an ice-water bath increased the rate of distillation in the second case quoted by about 10 per cent, the distillate being at a temperature of 12° C. It is clear that the condenser was by no means overloaded.

A final experiment in which the water bath was actually boiled and the receiver refrigerated and the condenser feed water rate increased to 100 gal. per hour gave a mean distillation rate of about 8 l. per hour; the temperature of the distilling liquid was 35° C. and of the distilled liquid 13° C.

In no case was any attempt made to concentrate to dryness and the rates of distillation referred to are those observed in concentration from 5 to about 15 per cent. The rates of distillation would have fallen considerably in all cases as the concentration of the material was increased.

# Microchemical Apparatus

THREE new British Standards concerning microchemical analysis (B.S. 1428 : 1950 : A.1, D.2 and D.3, 2s. each) have just been announced by the British Standards Institution.

These three standards are the first of a comprehensive series on microchemical apparatus to be published. The growth of microchemistry in recent years and the increased manufacture of microchemical apparatus has made it desirable to undertake a systematic review of the methods in use. The aim is to determine which of these methods are likely to find a permanent place in microchemical practice, and to specify constructional and dimensional requirements so as to provide standards for properly constructed apparatus. This will help to eliminate uncertainty as to the accuracy of results.

Group A of the series comprises combustion trains for the determination of elements, and part A1 describes the standard Pregl type of carbon and hydrogen train. A general assembly drawing is included as well as dimensional drawings of the main components. A pre-heater is recommended and a type of flowmeter is described as an optional alternative to the pressure regulator and bubble counter. Requirements of the quality of glass for the combustion tube and of the rubber tubing are included.

Volumetric microchemical apparatus is included in Group D, of which part D1 was published in 1948 as B.S. 846, Part 3: Burettes with pressure-filling device and automatic zero. In accordance with current practice for standards on volumetric glassware, only the essential details are mandatory and most of the dimensions are given for the guidance of manufacturers.

Part D2 describes pipettes calibrated for content and designed to facilitate the washing out of a measured quantity of liquid. Standard sizes listed are 0.1, 0.2, 0.5 and 1 ml., and the design is such that a single size of plunger will serve for all. The approved methods of using these pipettes, both with and without the plunger, are described in an appendix.

Part D2 describes pipettes calibrated for type of micro-nitrometer for use with the micro-Dumas nitrogen combustion train (to be published shorty as Part A2). The total capacity of the graduated tube is 1.5 ml., each division representing 0.01 ml. A porcelain stand and a caustic potash levelling vessel with a plastic support, convenient for use with nitrometer, are described in an appendix. Detailed drawings of the nitrometer and the ancillary apparatus are included.

A new British Standard for one-mark bulb pipettes (B.S. 1583 : 1950) has also been announced. Sixteen sizes of pipette from 1 ml. to 100 ml. capacity are specified. These pipettes are most in demand for general laboratory use. Full dimensions are given, but in accordance with current practice in British Standards for laboratory glassware, only the essential ones are listed as mandatory, the remainder being given for the guidance of manufacturers. Standard methods are included for the determination of capacity and delivery time. Tolerances are listed for both. An appendix gives the recommended sizes of glass tubing.

# MODIFIED HOT-AIR DRIERS

## *A Simple Belgian Design*

HOT air driers of simple design, using producer gas and permitting economical operation have been designed by M.-G. San and produced in collaboration with Belgian manufacturers. The description of the new driers (*Chemie et Ind.*, 64, 310-314) suggests that they are capable of producing useful economies, having an efficiency of up to 90 per cent, using cheap local fuel and requiring no independent motive power.

They appear to be specially suited for colonial conditions, as in the Belgian Congo, but are not devoid of interest for most advanced industrial countries.

The author has noted some of the disadvantages of the usual methods using pipes heated by steam or other medium. He indicates that among the main features of the new gas driers are elimination of all piping, total use of heat of combustion, except that lost through the walls of the gas producer, so that thermal efficiency is high, space and equipment are saved. Temperature control is said to be easy. The design will probably best be understood by reference to the accompanying sketch of an industrial driers, as manufactured in Belgium. Fuel container 6 has an opening at top 8, with chimney 9, an opening at 7, ash outlet at 1, hearth and air inlets at 2 and 3, refractory lining 5, air inlets at 10, 11 in chamber 12, of which the first directs air to fuel in C, while the second assists combustion of the gas produced which takes place in 12.

### Moderating Temperature

The burnt gas passes into a mixing chamber 15, in which are several openings at bottom and top; the former at 13 permit entry of gaseous fluid from outside which mixes with the hot gases from 12 and passes out through top openings 14. Temperature is thus moderated and prevented from rising too high to damage the walls of 15.

The gas mixture passing out at 14 mixes with the surrounding gas medium at D and heats it. Owing to the fairly generous dimensions provided from air inlet 3 to outlet 14, losses of fuel are small.

It is claimed that more efficient combustion is ensured by direct burning of part of the fuel at C, admitting air at 10. Two zones are thus formed: A is the true combustion zone, and B is a reduction zone for gas coming from A. As ash passes downwards the surfaces at C have always fresh fuel from container 6, and natural draught ensures proper circulation of gases.

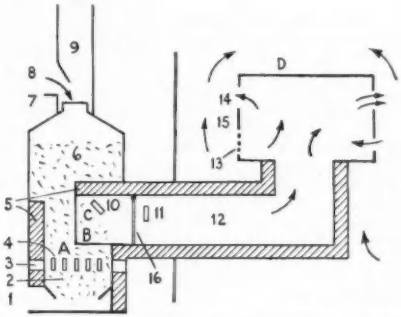



*Diagram of the drier, showing circulation of gases round the mixing chamber*

When lighting up, a shutter at 16 closes the connection between producer and chamber 12 and at the same time the feed inlet at 8 is opened, permitting escape of smoke, etc., through 9. In about 30 minutes to one hour combustion is well established and reduction zone B becomes incandescent, as can be seen through sighting hole or window. Shutter at 16 is then withdrawn and opening 8 closed. Gases pass then into 12 where they are burnt and normal operation proceeds.

### Use of Cheap Fuel

It is observed that the relatively large passages guarantee not only sufficient natural draught without fans or exhausts (*i.e.*, motive power) but also prevent undue contamination with dust and ash because of low gas velocity. Various cheap local fuels may be used, in the colonies, dry wood, vegetable waste, etc. Coke also may be employed, but coal usually is unsatisfactory. Combustion is controled by regulating the admission of air. Once the desired temperature is obtained this control needs little further attention, and temperature variations are only of a few degrees.

Use of the drier for pyrethrum flowers, for tea, coffee, and general industrial purposes is described.

# ANALYSIS OF THE ALKALI METALS

## *The Detection and Determination of Sodium and Potassium*

SODIUM is generally determined with one of the triple acetate reagents. As recently as 1928 Barber and Kolthoff advanced the first completely satisfactory method for the determination of sodium. The sodium was precipitated as sodium zinc uranyl acetate and the precipitate weighed. A good conversion factor for sodium was obtained and, indeed, the method is still extensively used according to the procedure outlined in the original paper. Several workers have used other divalent metals in place of zinc, *e.g.*, magnesium and nickel, but these do not offer any advantages over the zinc reagent.

### Duval's Work

Mention may be made of the thermogravimetric work of Duval, who stated that sodium zinc uranyl acetate loses its 6 molecules of water of crystallisation between 75° C. and 118° C., and that the precipitate should be ignited to the pyrouranate $1/2\ U_2O_7Na_2.U_2O_7Zn$, which is formed at 360° C. and remains at constant weight up to 674° C. As this revolutionary work contradicts that of countless workers who have been drying triple salt precipitates at 105° C. since 1928, it would seem that an immediate investigation is required.

Copper uranyl acetate is of interest. Lithium is precipitated along with sodium by the usual triple salt methods, but remains in solution if copper uranyl acetate is used as precipitant. In other words, a quantitative separation of sodium from lithium may be achieved.

At the present time, it is not known with certainty if calcium interferes with the determination of sodium as triple salt. Miller and Traves, who were the first to apply the triple acetate method to the determination of sodium in silicates, stated that calcium caused a slight positive error. Wiggins and Wood, on the other hand, obtained slightly low results in presence of calcium, while Haslam and Beeley found that calcium did not interfere in the determination.

In view of these conflicting statements, it would seem that a titrimetric finish is preferable if calcium is present. Several titrimetric methods for the determination of triple salt have been proposed, based on the following reactions:—

(1) Iodometric titration of the zinc ion.
(2) Reduction of the uranyl ion and subsequent oxidimetric titration.
(3) Distillation of the acetate ion, followed by alkalimetric titration.
(4) Direct alkalimetric titration of the triple salt.

Of these four reactions, the last is undoubtedly the most convenient. Under the conditions used by Morton, nine molecules of sodium hydroxide will react with one molecule of triple salt. The equation for the reaction is as follows:—

$$NaZn(UO_2)_3(CH_3COO)_9.6H_2O + 9NaOH = 2UO_2(OH)_2 + Zn(OH)_2 + 9CH_3COONa + NaHUO_4 + 7H_2O$$

The maximum amount of sodium Morton determined was 1 mg. More recently, Belcher and Nutten have carried out a potentiometric investigation of the reaction, and have extended the method to the range 1-20 mg. of sodium. If a dilution of less than 1 mg. per ml. of triple salt is used, the stoichiometry of the reaction breaks down and low results are obtained.

### Other Reagents Proposed

Several other reagents have been proposed for the detection and determination of sodium; for example, fluosilic acid, fluoaluminic acid, fluoferric acid, 6,8-dichlorobenzoylene urea and resorcinol sulphonic acid, but none of these is as efficient as the triple salt procedures and, indeed, fluoaluminic acid will not detect sodium at a concentration of less than 4 mg. per ml.

For the determination of sodium in refractories the method generally used for opening out the material is the well-known Lawrence-Smith procedure. Some workers state that, if the amount of aluminium in the refractory is less than 7 per cent, then the Berzelius hydrofluoric acid decomposition method should be used, while, if the aluminium content exceeds 7 per cent, the Lawrence-Smith method is to be preferred.

The Lawrence-Smith procedure suffers

* Summarising the proceedings of the first meeting, in Birmingham, of the newly formed Midlands Analytical Methods Discussion Group. The speakers were Mr. R. Belcher, senior lecturer in analytical chemistry, Birmingham University, and Mr. G. Cummings, British Ceramics, Ltd., who summarised from the academic and industrial viewpoints, respectively, the methods now in use for the detection and determination of the alkali metals.

from two disadvantages: (1) The high relative blank with low alkali contents, and (2) Materials such as felspar containing 12-14 per cent alkali metal oxides require two sintering operations for complete extraction of the alkalis.

These disadvantages may be avoided by using the methods of Marvin and Woolaver and of Kallmann.

Marvin and Woolaver's method consists of dissolving the silicate in perchloric and hydrofluoric acids. The resulting perchlorates are evaporated to dryness and ignited at 500° C., at which temperature aluminium, iron, titanium, magnesium and manganese are converted to oxides, whereas sodium, potassium and calcium give the corresponding chlorides with evolution of oxygen. On leaching the decomposed perchlorate with slightly alkaline hot water a solution is obtained which contains only sodium, potassium and calcium. The solution is thus similar to that obtained after the Lawrence-Smith extraction.

### Kallmann's Method

Kallmann uses a perchloric-hydrofluoric acid decomposition together with the Willard and Smith reagent (20 per cent HCl in anhydrous n-butanol), for separation of the alkalis from other metal ions. The perchlorate solution obtained from the decomposition is evaporated just to dryness and the residue treated with n-butanol. The potassium and some sodium remain out of solution as perchlorates, and the remainder of the sodium is precipitated as chloride with Willard and Smith's reagent. Aluminium, calcium, magnesium, iron and manganese, and small amounts of titanium, zinc and phosphorus do not interfere.

The resulting precipitate can be filtered and ignited at 600° C. to the "mixed chlorides," in which potassium is best estimated as perchlorate in n-butanol-ethyl acetate, and sodium as triple salt. Barium and lead interfere and must be removed before precipitation with Willard and Smith's reagent. Lithium remains in solution and so may estimated in the filtrate.

### Potassium Determination

Potassium has more insoluble salts than sodium and, consequently, more methods for its determination are available. The four reagents which have hitherto been most extensively used for the detection and determination of potassium are tartaric acid, chlorplatinic acid, perchloric acid, and sodium cobaltinitrite.

Tartaric acid is very seldom used nowadays. It does not give as sensitive a test for potassium as does sodium cobaltinitrite. Chlorplatinic acid gives a good separation of potassium from sodium in alcoholic medium. The precipitate may be determined in several ways; thus, it may be weighed, or reduced with hydrogen. The hydrochloric acid then evolved may be determined alkalimetrically or the residual mixture of platinum metal and potassium chloride may be weighed, or the chloride extracted and determined by one of the many well-known procedures.

### Use of Lithium Chlorplatinate

The potassium chlorplatinate precipitate has been claimed by several workers to be inconstant in composition, and, hence, an empirical factor has to be employed to obtain the true weight of potassium in the precipitate. Smith and Shead, however, state that a precipitate of theoretical composition is obtained if lithium chlorplatinate is used as precipitant.

The high cost of platinum militates against the use of this method.

Probably the most accurate method yet proposed for the determination of potassium is the perchloric acid procedure. Potassium perchlorate is slightly soluble in water but virtually insoluble in certain organic solvents. A mixture of ethyl acetate and n-butanol (4:1) has been claimed by Willard and Smith to be the best solvent for the precipitation, since in this mixture the solubility of potassium perchlorate is least, and that of sodium perchlorate is greatest. Several other cations are precipitated as perchlorates in the same conditions, with the result that a preliminary separation of potassium, generally as cobaltinitrite, or of the interfering cations, is required.

The most common method for the determination of potassium is the well-known cobaltinitrite procedure. Potassium cobaltinitrite is the least soluble known salt of potassium and, hence, is the most sensitive means of detecting potassium. There has been much controversy as to the composition of the precipitate and it has now been established beyond all doubt that the precipitate is not constant in composition. At best, an empirical factor may be employed under certain definite conditions of precipitation, but this is not entirely satisfactory and a new approach to the subject is required.

Lithium may be separated from the other alkali metals by virtue of the solubility of its chloride in certain organic solvents. Acetone, isopropyl alcohol, and cyclohexanol are particularly effective solvents for this extraction, though extreme care must be taken that the solvents are absolutely dry.

# Technical Publications

THE suitability of metal unit laboratory equipment for export because of its adaptability and the minimum skilled labour required for installation is recalled by the latest illustrated leaflet "Metal Unit Laboratory Furniture" iussed by Baird & Tatlock (London), Ltd. The corrosion resistant steel construction of the furniture is an asset in tropical and sub-tropical climates, while the unit system facilitates transport and shipment. The company now has orders for equipping three laboratories in Canada—the Department of Health, and the National Research Council, Ottawa, and the Admiralty Research Laboratories, Halifax. They are worth together well over a quarter of a million dollars.

* * *

CLASSIFIED lists of chemicals, showing the makers of each kind, are to be found in the 82nd edition of the *Chemical Manufacturers Directory*, which is now on sale (Simpkin Marshall, Ltd., 5s. 6d.). Also given in the directory are separately annotated lists of the chemical manufacturers in England and Wales and in Scotland and Ireland.

* * *

RADIOACTIVE materials, mineral resources, alkali, coal, natural gas, petroleum, and salt mining are dealt with under the "Mining Laws of Canada." This is a digest of Dominion and provincial laws and regulations affecting mining (44th edition) prepared by Arthur Buison, and just published in Ottawa by the King's Printer and Controller of Stationery (price 50 cents.)

* * *

"RECENT Advances in Virus Research," by Professor Wendell M. Stanley, professor of biochemistry and director of the virus laboratory, University of California, is included in the report for 1949 of the Smithsonian Institution, Washington, D.C. The report also contains an important and reasonably up-to-date survey by Carl D. Anderson, California Institute of Technology of "The Elementary Particles of Physics."

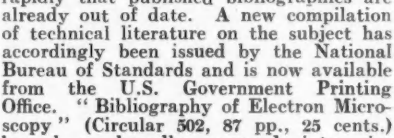
* * *

TECHNICAL information for users of tin has been prepared in a number of publications by the Tin Research Institute. These have been listed for convenience under three main groups—for the practical user, the analyst, and the research worker.

TUNG-oil—its production, consumption and application—is the subject of an article by G. W. T. de Mattos in the autumn number of *Colonial Development* (Vol. 1, No. 3), the quarterly magazine of the Colonial Development Corporation. A map and text summarise the various operational undertakings by territories and divisions of the corporation. No mention is made of the ground nuts scheme.

* * *

ELECTRON microscopy has expanded so rapidly that published bibliographies are already out of date. A new compilation of technical literature on the subject has accordingly been issued by the National Bureau of Standards and is now available from the U.S. Government Printing Office. "Bibliography of Electron Microscopy" (Circular 502, 87 pp., 25 cents.) has been broadly grouped into size categories: Books, survey articles, instrumentation, electron optics, related instruments and applications.



[By courtesy of J. W. Towers & Co., Ltd.

*This fully automatic balance (Model 98A), has mechanically operated weights up to 100 gm. The operation of the rider weights uses a parallelogram movement, giving a straight lift. This is an improvement on the usual arc or semi-circular movement. Readings are made direct to 0.1 mg. (half a division) without the use of a vernier*

OVERSEAS CHEMISTRY AND INDUSTRY

# THE BRAZILIAN MARKET FOR CHEMICALS

## *Improved Prospects for U.K. Sodium Products*

THE recent U.K.-Brazilian trade agreement provides for the export from this country to Brazil, in the year ending June 30, 1951, of goods to the value of £33.16 million f.o.b., as well as sales of oil, petroleum and petroleum products by British controlled oil companies to the value of £11.46 million. It invites imports from Brazil of £51.44 million f.o.b. Payments will be in sterling. The difference of £6.82 million has been allowed to offset the normal deficit in Brazil's balance of payments with the United Kingdom. The schedule of exports from the U.K. includes coal, iron and steel manufactures, non-ferrous metal manufactures, chemicals, machinery, vehicles, textiles, pottery and other consumer goods.

*BRITISH exports to Brazil of chemicals, drugs, dyes and colours have more than doubled in value in two years, the total for* 1949 *being* £2,771,902, *compared with* £1,638,622 *in* 1948 *and* £1,056,916 *in* 1947. *There are good prospects that the* 1950 *total will be much higher; the figure for the first half of the year was* £2,124,319 *and for the nine months to September was* £3,993,839. *Almost a half of this last total was accounted for by caustic soda* (£1,346,695) *and sodium compounds, including carbonate, soda crystals, soda ash and bicarbonate* (£423,870).

The following sums are allotted for exports of chemical products to Brazil: Unspecified organic products, £200,000; soda ash, £500,000; copper sulphate, £100,000; sulphites, hydrosulphites and hyposulphites, £100,000; aniline dyes, except sulphur black, £300,000; caustic soda, £1.2 million; pharmaceutical products, £400,000; unspecified inorganic chemical products £600,000; insecticides and similar preparations, £150,000.

The gross chemical products allotment total of £3.55 million is approximately £900,000 more than the value of shipments by the U.K. to Brazil prior to the devaluation of sterling. The schedules may well be exceeded if Britain is able to increase supplies, as exports from the U.S.A. are being restricted owing to the international situation. Imports of these products by Brazil amounted to £6,727,000 during the first four months of 1950, but supplies on hand are barely sufficient for three months.

The Brazilian Confederation of Commerce has petitioned the president of the Republic to facilitate stockpiling of caustic soda, soda ash, sulphur and some other essential chemicals. Stocks of soda ash are dangerously low, and importers have cabled the Brazilian Commercial Office in London to try and accelerate shipments. During the first half of this year 19,400 tons of soda ash were shipped from Britain to Brazil, but this is 600 tons less than normal requirements.

### Price Control

Brazilian production of aniline dyes is now of the order of 700 tons per annum, but local consumption has reached 1000 tons annually and is increasing rapidly. In view of the existing delicate situation the sale of chemical products in Brazil is now being officially controlled. Importers and re-sellers may add only 30 per cent to the cost by way of profits. The list of controlled products is a long one and includes bicarbonate of soda, caustic soda, phenolic acids and resins, pigments, driers and thinners for paint and varnish manufacturers, soda ash, sulphur and the majority of products used in the pharmaceutical industry.

The Consultative Commission for Foreign Trade announces that manufacturers of glue for plywood may import up to 500 tons of casein during the remainder of the season, but only from soft-currency countries. Among other items which are to be imported exclusively from such countries are caustic soda and zinc oxide. Pharmaceutical products of British and American origin used in the treatment of leprosy, malaria, verminous and certain parasitic diseases are now exempt from payment of the excise tax in Brazil.

Among the Brazilian products to be shipped to Britain under the new trade agreement, and the sums allotted, are: oiticica oil, £272,000; tung oil, £100,000; ipecacuanha, £78,000; menthol, £577,000; copaiba oil, £5000; sassafras, bois de rose

and peppermint oil, £225,000; various essential oils for processing and re-export, £40,000; castor seed, £1.5 million; castor seed oil, £300,000; cottonseed oil, £660,000; peanut oil, £120,000.

Since supplies from China and Japan have been curtailed, the price of Brazilian menthol has risen to £12 1s. 7d. per kilo, from £9 12s. in 1949. During the last crop year the production of menthol crystals in Brazil amounted to 80 tons, and stocks on hand are estimated at 40 tons.

Great Britain is the principal buyer of Brazilian peppermint oil, which is extracted exclusively from the *arvensis* variety; 73.5 tons were produced last year. In San Paulo the *piperite* variety is being grown this year to meet the needs of American manufacturers of certain toothpastes. The arvensis oil, even after refining, radically alters the colour and the taste of the preparations in question. The production of other essential oils in Brazil last year was: Eucalyptus 16 tons; bois de rose 304 tons; sassafras 55 tons; vetiver 505 kilos.

Two factories are now producing potassium chlorate in San Paulo, but all the raw materials except muriatic acid are still imported. Although the maximum capacity of the plants is 420 tons yearly, the output is limited to 239 tons. There is little immediate prospect of the industry expanding as the manufactured product (chlorate) pays lower customs duties than the raw material (chlorite). As a result imported chlorate costs less than that manufactured locally. To meet national requirements 16,101 tons of chlorite and 760 tons of chlorate were imported last year, chiefly from Sweden.

Merchandise and samples, of which the value does not exceed the equivalent of U.S. $25.000 in the country of origin, may be sent to Brazil without prior licence, provided they do not call for exchange cover. Since the prior licence system was introduced the number of small parcels entering Brazil has increased enormously. It is a common custom for consignments to be split up into several packages so as not to exceed the permitted value, and payment is arranged directly instead of through the Bank of Brazil.

## *Developing the Indigenous Oils of Pakistan*

PAKISTAN's progressive policy for the fullest production of indigenous edible oils is reflected in several projects indicating willingness to depart from the traditional sources and production methods.

Establishment of a Central Fisheries Department with one section for West and the other for East Pakistan is under consideration. Its duties would be the development of biological and technological research of fisheries.

The fishery resources of Pakistan are considerable but they have not so far been exploited commercially. Experiments, however, show that local fish are suitable for the manufacture of certain products, and that there are good prospects of a fish oil industry being developed.

Of the fish oils so far investigated, shark liver oil is the most important. Sharks are abundant on the East Pakistan coasts. The oil content is often between 60 to 70 per cent of the liver weight of sharks, and the vitamin potency is higher than the average vitamin content of any other fish. Therapeutically and chemically there is no difference between shark and cod liver oil. It is also used for soap-making, tanning and as lamp-oil.

Among other fish oils, punti and hilsa oils are fairly important. The former is exported to foreign markets for industrial uses. The method of extraction has so far been crude and the product obtained of inferior quality, but it can be satisfactorily used in soap-making, paints and varnishes.

Oil extracted from aquatic mammals, particularly the porpoise, is most valuable for lubrication of precision machinery. The fins of large sharks are dried or smoked before they are exported. Isinglass is obtained from air-bladders of several species of sea, estuarine and freshwater fish. The annual quantity of shark fins and isinglass exported from Pakistan is approximately Rs.359,000.

Fish-meal is prepared from small fish not used for human consumption, fish-waste from fish-curing yards and prawn shells. The annual exports of fish manures from Pakistan amount to about Rs. 2 million.

Soap is mostly produced on cottage industry scale in Pakistan. There are about 812 big and small factories which make the country self-sufficient in washing soap. Efforts are being made to enable Pakistan to supply its own requirements of toilet and medicated soaps. One toilet soap manufacturing plant has already been installed in Karachi and another is under construction, while a third is being installed in Bahawalpur.

# • OVERSEAS •

### Canadian Beet Sugar Crop

The 1950 sugar beet crop with a total of 155,250 tons announced by the Canadian Department of Agriculture is the highest for the 11 years that the industry has been in existence in Manitoba. The previous largest crop was 128,800 tons in 1942.

### Turkey's Underdeveloped Oil

Reports from Turkey indicate that the country's petroleum reserves are now officially estimated to total about 55 million tons. Crude output between 1946 and 1949, however, aggregated only 16,500 tons, of which only 10,500 were refined. Expert opinion in Turkey considers the participation of private foreign and possibly Turkish capital, essential for adequate development.

### New Silicon Resin Enamel

A silicon resin enamel, said to have the surface hardness and chemical resistance of porcelain without its brittleness, was recently demonstrated in the U.S.A. at a research conference held at the Glidden Company's laboratory, Chicago. The new finish, which can be both hard and flexible, is not as heat resistant as porcelain, but will withstand much higher temperatures than the customary organic resins.

### U.S. Corrosion Testing Station

Investigation of corrosion problems for the U.S. Government service will be carried out at a testing station which has been established at Wilington, North Carolina, operating under the direction of the International Nickel Co. With a new laboratory and the marine exposure racks which have been added at Harbour Island, the section provides facilities for the study of metals, alloys, non-metallic materials and protective coatings in sea-water and sea air.

### Italian Patent Law

The Italian authorities are preparing legislation concerning patents and trade marks. It is reported that patent protection will be extended from 15 to 20 years, while the validity of trade marks will be six instead of four years. The principle of compulsory licensing for the utilisation of patent rights is to be introduced. Registrations of patents by Germans are to be permitted again. An official register of advisors on patent matters is to be compiled. The profession of patent attorney is unknown in Italy.

### Agar Oil Production in Assam

Investigations by the Indian Forest Research Institute in Dehra Dun have indicated that agar wood grown in Assam may yield agar oil of good quality. A small distilling plant is being developed.

### China's Wolfram for U.S.S.R.

Reports from South China state that the authorities have taken steps to increase wolfram-ore output, for which there is heavy demand from the Soviet Union. Most of China's output is now being delivered to Russia. No detailed figures of this traffic are available, but it is stated that some 12,000 tons were delivered at the beginning of August.

### Carbon Black in East Berlin

The Hydrocarbon National Corporation in Berlin—Blankenburg (Russian zone of Berlin) is reported to have exceeded pre-war output by producing 1200 kg. of carbon black per day, three shifts being worked. Carbon black from East Berlin is stated to be finding a ready market not merely in the Iron Curtain countries, but also in Scandinavia.

### Two New Sulphuric Acid Plants

The Chemical Construction Corporation, New York, has already broken ground for two new sulphuric acid plants to be built for the National Lead Company, New York. One will be located in St. Louis, Missouri, and the other in Sayreville, New Jersey. Both will have capacities in excess of 300 tons per day, which will help to expand the National Lead Company's titanium pigment facilities.

### Canadian Industries Expansion

The construction of a new explosives factory in Alberta has recently been begun by Canadian Industries, Ltd., as part of its long-term industrial expansion programme. A study of the manufacture of several chemicals at present imported in large quantities is also being undertaken, and with a view to enlarging its markets, the company is to sell tetra-ethyl lead compounds and other petroleum additives. Total sales for the first six months of this year were considerably larger than those in the same period of 1949. Additional plant capacity for nylon yarn and staple and cellophane cellulose film and other products were brought into operation. The manufacture of polythene film and other new products contributed to the increased sales.

# · PERSONAL ·

PRINCESS ELIZABETH, as president of the Royal Society, last week presented the Albert Medal to SIR EDWARD APPLETON, F.R.S., in private audience at Clarence House. It was not necessary to have a deep knowledge of science, said Her Royal Highness, in order to appreciate Sir Edward's abilities and his achievements both in pure and applied science.

The following officers have been appointed to serve the International Scientific Film Association for the year 1950-51: President: JOHN MADDISON (Great Britain); vice-presidents: LUC HAESAERTS (Belgium), and JAN KORNGOLD (Poland); hon. secretary: JEAN PAINLEVE (France); hon. treasurer: MARIO PONZO (Italy). Mr. Maddison is in charge of the distribution of non-theatrical films for the British Government and the Central Office of Information.

COL. H. C. SMITH, deputy chairman of the Gas Council, has been re-elected president of the British Road Tar Association for the fourth year in succession. MR. G. A. HEBDEN, director and general manager of the South Yorkshire Chemical Works, Ltd., who represents the coke oven interests, and MR. STANLEY ROBINSON, chairman and managing director of the Midland Tar Distillers, Ltd., who represents the tar distilling interests, have been re-elected vice-presidents. MR. W. K. HUTCHISON, chairman of the South Eastern Gas Board. is re-elected honorary treasurer. The chairman of the managing council is MR. J. DAVIDSON PRATT, director and secretary of the Association of British Chemical Manufacturers.

The principal speakers at the annual dinner, in London last week, of Faraday House Old Students' Association were: LT.-GEN. SIR RONALD WEEKS, chairman of Vickers, Ltd., and of the National Advisory Council for Education in Industry and Commerce, and SIR NOEL ASHBRIDGE, director of BBC technical services. Past-presidents of the Institution of Electrical Engineers present included the EARL OF MOUNT EDGCUMBE, SIR VINCENT DE FERRANTI, SIR ARTHUR FLEMING and MR. P. V. HUNTER.

PROFESSOR C. CHAUDRON, president of the French Metallurgical Society has been awarded the "Luigi Losana" gold medal of the Italian Metallurgical Association, instituted in memory of the famous Italian metallurgist.

MR. J. E. COLEHAN, research chemist, has been appointed superintendent of the acid plant at Bradford Corporation Sewage Works at Esholt. He was educated at Bradford Technical College.

DR. ANGUS MACRAE, an industrial psychologist, has been appointed secretary of the British Medical Association in succession to Dr. Charles Hill, M.P. for Luton. Dr. Macrae has been deputy secretary since 1948. He was chairman of the BMA committee on nutrition.

MR. A. J. KIRK has joined the staff of the industrial department of Philips Electrical, Ltd. He was previously with Petbow, Ltd., manufacturers of arc welding plant, as commercial manager.

DR. L. J. SPENCER has completed 50 years as honorary editor of the *Mineralogical Magazine*.

DR. P. H. PLESCH has been appointed lecturer in chemistry at the University College of South Staffordshire.

## Iron and Steel Arbitration

THE Iron and Steel Arbitration Tribunal, which has been set up to hear and determine disputes connected with stockholders' compensation and other matters under the Iron and Steel Act, has been composed as follows: Legal member and president (except in Scottish proceedings): Sir John Howard; for Scotland: Mr. Douglas Alexander Mortimer. Members of the tribunal for all proceedings: Sir Frederick Alban and Mr. E. C. Ellen.

## Obituary

THE death is announced, at the age of 55, of DR. GEORGE ALEXANDER HANKINS, director of mechanical engineering research in the DSIR. He had been on a visit to the department's new £1.5 million research station at East Kilbride, in the construction of which he had been associated. His work on wind-tunnel experiments usefully contributed to the development of aircraft to fly at supersonic speed.

M. LOUIS PINEAU, director from 1925 to 1940 of the French National Office for Liquid Fuels, which he helped to create, has died in Paris, aged 62. He took also a leading part in the establishement of the Ecole Nationale du Pétrole in Strasbourg.

# HOME

### Shell Chemicals HQ

Shell Chemicals, Ltd., has removed its head offices to Norman House 105-9 Strand, W.C.2. (Tel: Temple Bar 4455).

### Steel Production Over 17 m. Tons

British steel production in October was at the annual rate of 17.04 million tons. The last time it was over the 17 million ton mark was in March.

### Explosion at Chemical Plant

Two workmen were killed by an explosion on Monday last while working on a chemical plant at Shell Refineries, Stanlow, Ellesmere Port. The plant is in the open, and no damage was done to buildings or other property.

### Enlarged Tank Wagon Plant

The Dalzell Electric Welding Company, Motherwell, has extended its operations by the incorporation of a large factory in Bellshill, Lanarkshire, where it will specialise in the manufacture of road tankers for chemical and other liquids.

### Tin Price Soaring

Large gains in the price of tin were recorded on the London Metal Exchange throughout the week. On November 6 the Ministry of Supply sold metal for cash in the closing session at £1170 and £1180 per ton. On Tuesday the price rose by over £100 to around £1290 per ton for some types of business.

### Increases in Oils and Fats Prices

The following changes in the prices of unrefined oils will apply during the four-week period ending December 2, 1950: Linseed oil, from £134 to £136 per ton; sunflower acid oil, soya acid oil and maize acid oil from £92 to £94 per ton. Prices of all other unrefined oils and fats and technical animal fats allocated to primary wholesalers will remain unchanged.

### New Provincial Branches

Additions and alterations to its local service available for dealers throughout the country is announced by Philips Electrical, Ltd. The Manchester branch is now in larger premises at 40 Little Lever Street. At Liverpool a new showroom was opened on November 3 at 6-10 Leeds Street. In Cardiff there are larger premises at 11-13 Penarth Road and a showroom will be opened shortly. A new lighting depot was opened this week at 27 Landport Terrace, Southsea, Portsmouth.

### Dearer Lead

The domestic price of good soft pig lead was increased on November 1 by £8 to £136 a ton. This followed a rise of one cent to 17 cents in the U.S. market.

### Midlands Fire Damage

Several thousands of pounds worth of raw rubber, sulphur and aluminium powder were destroyed in a fire at Market Harborough recently. Workmen had to wear protective clothing clearing up and salvaging raw rubber.

### Fire in Manchester Fine Chemicals Plant

Normal trading has been resumed at Whitefield, Manchester factory of Theodore St. Just & Co., Ltd., following the recent fire in the fine chemicals manufacturing department, which involved certain new plant then under construction.

### Dollars for Sugar-refining Plant

Sugar-refining machinery worth $1 million has been ordered by a Central American republic from a Derby firm. The order includes the world's first complete turbine-driven train containing cane-crushing plant.

### Largest Refinery Column

A stripper column, the largest of its kind yet manufactured in Britain, has been completed by Babcock & Wilcox, Ltd., of Renfrew, for the oil refinery project at Stanlow. The column, 132 ft. high, and 11 ft. 3 in. in diameter, had to be conveyed in three sections, the largest of which was 81 ft. and weighed 100 tons.

### Cellulose Acetate Containers

Purchase tax is now payable on rigid, non-flexible transparent celluloid and cellulose acetate cases, of a size not exceeding 6½ in. by 4 in., at the rate of 66⅔ per cent for articles of personal or domestic use, and 33⅓ per cent for goods chargeable as stationery and office requisites. Such articles as season ticket, document and menu holders are affected.

### Coal Production

Output of coal last week was slightly higher than in the previous week, but the total to date appears to cast doubt on the likelihood of the year's export objective being maintained. Comparative figures are:—Last week: 4,380,100 tons (deep-mined 4,139,000 tons, opencast 241,100 tons). Previous week: 4,377,500 tons (deep-mined 4,119,600 tons, opencast 257,900 tons).

# Next Week's Events

## MONDAY, NOVEMBER 13

**Society of Chemical Industry**

London: The Royal Institution, Albemarle Street, W.1, 7 p.m. "The Chemotherapy of Cancer." Professor A. Haddow, Director, Chester Beatty Institute, The Royal Cancer Hospital.

Bradford: Technical College, 7 p.m. "Chemical Processing for the Textile Industry" J. G. Evans. Jointly with the Bradford Chemical Society.

**Royal Institute of Chemistry**

London: Chelsea Polytechnic, Manresa Road, S.W.3. 7 p.m. The Physical Chemistry of Haemolysis" Dr. J. H. Schulman.

**Institute of Metals**

Glasgow: 39 Elmbank Crescent, 6.30 p.m. Symposium on Corrosion Experiences, by members of the local section.

**Institute of Packaging**

Manchester: Grand Hotel. "Collapsible Tubes" J. G. Wilson.

**Institution of Plant Engineers**

Maidstone: Technical College, 7 p.m. "Corrosion Problems." Dr. Gyngell.

**Institution of Production Engineers**

Manchester: Grand Hotel, 7.30 p.m. "Mechanical Handling." Jointly with the Institution of Works Managers.

## TUESDAY, NOVEMBER 14

**The Chemical Society**

Belfast: Queen's University, Department of Chemistry lecture theatre, 7.30 p.m. "Some problems in the Chemistry of the Polysaccharides." Professor E. L. Hirst, F.R.S. Jointly with R.I.C., S.C.I. and the Andrews Club.

**Institution of Works Managers**

Liverpool: Adelphi Hotel, 6.30 p.m. "The Costing of Engineering Services." H. Mason Bibby.

**Institution of Plant Engineers**

Manchester: The Engineers' Club, Albert Square, 7.15 p.m. "The Application of Colour in Industry." H. L. Gloag, A.R.I.B.A., of DSIR.

**Royal Institute of Chemistry**

Wigan: Mining and Technical College, 7 p.m. "Partition Chromatography." Dr. R. R. Goodall.

Norwood: Technical College, Knight's Hill, S.E.27, 6.30 p.m. Film Display.

**Institution of the Rubber Industry**

Edinburgh: 25 Charlotte Square, 7.30 p.m. "Safety in the Rubber Industry." Report of the N.J.I.C. Committee.

**Hull Chemical and Engineering Society**

Hull: Church Institute, Albion Street, 7.30 p.m. "Chemicals from Petroleum." Dr. J. L. Edgar.

## WEDNESDAY, NOVEMBER 15

**OCCA**

Hull: Y.P.I., 7 p.m. Junior Discussion Group.

**Royal Institute of Chemistry**

Cardiff: "Solid and Catalytic Reactions." Professor W. E. Garner, F.R.S.

London: Waldorf Hotel, Aldwych, W.C.2, 6.30 p.m. Annual General Meeting. Discussion on "Terms of Engagement for Chemists" by R. L. Collett.

Ponders End: Visit to Thomas Morsons, Ltd. (Registered students only.)

**Society of Chemical Industry**

Birmingham: The University, Edmund Street, 6.30 p.m. "Recovery and Concentration of Acetic Acid in Cellulose Acetate Manufacture." W. F. Hastie.

**Institute of Fuel**

Manchester: The Engineers' Club, Albert Square, 6 p.m. "The Coal-fired Open Cycle Gas Turbine." W. V. Battock.

**Institute of Petroleum**

Chester: Grosvenor Hotel, 7.15 p.m. "Carbon Black Manufacture." (With film.) L. W. Cabot and J. W. Edminster.

**Institution of Plant Engineers**

Liverpool: Radiant House, Bold Street, 7 p.m. "Electronics in Industry." K. Marwood, A.M.I.Mech.E.

Bristol: Grand Hotel, 7.15 p.m. "Engineering Applications of Electro-deposited Metals." J. W. Oswald, A.R.I.C.

**Institution of Civil Engineers**

London: Great George Street, S.W.1, 6 p.m. "Welded Bridges and Hangers in Spain." Professor Dr. Ing. E. Torroja.

## THURSDAY, NOVEMBER 16

**Royal Institute of Chemistry**

Bristol: Grand Hotel. Social Evening and film show. Jointly with the Chemical Society and SCI.

Leicester: College of Technology, 7.15 p.m. "Research in Artificial Fibres." J. G. N. Drewitt.

Manchester: Midland Hotel. Dinner and dance. Jointly with SCI.

**Chemical Society**

London, Burlington House, Piccadilly, W.1, 7.30 p.m. Meeting for the reading of original papers.

Hull: University College, 6 p.m. "Recent Theories of Molecular Structure." Professor Sir John Lennard-Jones, F.R.S.

(continued at foot of next page)

# Law and Company News

## Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

### Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

FISONS, LTD., Ipswich, fertiliser manufacturers, etc. (M., 11/11/50.) Oct. 6, eight dispositions supplemental to a trust deed dated Sept. 4, 1950; charged on various properties in Scotland. *Nil. Mar. 6, 1950.

LAWRENCE (BRIGHTON), LTD., chemists. (M., 11/11/50.) Oct. 6, £500 deb. Phyllis C. Lawrence, Brighton; general charge. *£500 June 24, 1950.

### Satisfactions

A. E. BEILBY, LTD., Nottingham, chemists. (M.S., 11/11/50.) Satisfaction Oct. 12, of mort. reg. Aug. 29, 1949.

WELLCOME FOUNDATION, LTD., London, N.W., chemical manufacturers. (M.S., 11/11/50.) Satisfaction Oct. 6, that specified properties, comprised in a charge registered July 29, 1947, ceased to form part of the company's property or undertaking.

ELCO PLASTICS, LTD., London, E.C. (M.S., 11/11/50.) Satisfaction Oct. 10, of debenture registered July 27, 1950.

### Receivership

PH-ENTEX PRODUCTS, LTD., 408a Montrose Avenue, Trading Estate, Slough.

Mr. Chas. E. M. Emmerson, 28 King Street, Cheapside, E.C.2, was appointed receiver and manager on October 9, 1950, under powers contained in mortgage and charge dated July 1, 1949.

## New Registrations

**Organic Research Chemicals, Ltd.**

Private company. Capital £1000. Manufacturers of chemicals, gases, disinfectants, dyes, pigments, acids, drugs, etc. Directors: L. V. Pearkes, J.P., and H. J. F. Weiss. Reg. office: Poyle Trading Estate, Colnbrook, near Slough.

**P. B. Kent & Co., Ltd.**

Private company. (487,718). Capital £16,000. Manufacturers, importers and exporters of fertilisers, feeding stuffs, etc. Directors: R. T. Todd, Mrs. E. Kent, H. F. Wade and Lady Agnes O. B. Tait. Solicitors: Lucas & Co., Darlington.

**Kemp and Staples, Ltd.**

Private company. (487,852). Capital £200. Consulting, analytical, manufacturing, pharmaceutical and general chemists, etc. Directors: W. H. Kemp, G. E. Staples. Reg. office: 4 Cross Street, Cheadle, Staffs.

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NEXT WEEK'S EVENTS

**Society of Chemical Industry**

London: 11 Upper Belgrave Square, S.W.1, 6 p.m. "The Manufacture of Fletton Bricks." T. G. W. Boxall.

Salisbury: Bishop Wordsworth School, 7.30 p.m. "Colour, Colour Measurement and its Uses in Industry." G. J. Chamberlain, A.C.I.S.

**Textile Institute**

Nuneaton, Bull Hotel, 7 p.m. "The Manufacture of Viscose Rayon by the Continuous Process." L. Rose.

**Institute of Packaging**

Birmingham: Imperial Hotel. "Research To-day." Dr. G. I. Riddell, of P.A.T.R.A.

**The Pharmaceutical Society**

Hull: New York Hotel. Buffet Dance.

FRIDAY, NOVEMBER 17

**Royal Institute of Chemistry**

London: Connaught Rooms, Great Queen Street, W.C.2, 7 p.m. Annual Dinner-Dance.

**The Chemical Society**

Glasgow: The University, 7.15 p.m. "Some Problems in Gas Flow and Sorption." Professor R. M. Barrer.

Southampton: University College, 7.15 p.m. "Kinetics of the Bacterial Cell." Sir Cyril Hinshelwood, F.R.S.

Swansea: University College, 5.30 p.m. "Ion Exchange Resins." Professor C. W. Davies.

Workington: 7 p.m. "Manufacture, Distribution and Utilisation of Liquid Oxygen" C. R. Houseman.

**Biochemical Society**

London: St. Mary's Hospital Medical School. Meeting.

# The Stock and Chemical Markets

LATEST news from Korea affected sentiment in stock markets and early in the week sharp reactions were recorded by British Funds. Tin and rubber shares fell back, although further sharp gains were shown by the commodity prices resulting from fears of acute shortages if hostilities spread in the Far East. Share values later recovered moderately, and British Funds also attracted renewed attention.

Industrial shares are showing a steady undertone, reacting to the belief that there may be a change of Government early in 1951. Yields are in many cases fairly generous and there are hopes that dividends will be maintained. That, however, will depend on the trends in taxation and material costs.

Chemical and kindred shares were generally rather more active. Imperial Chemical were steady at 42s. 9d., Monsanto at 51s. and Laporte Chemicals 5s. units changed hands around 10s. 3d. Fisons have been more active up to 29s. reflecting satisfaction with the results and 9 per cent dividend on the larger capital. Albright & Wilson kept firm at 30s., Brotherton 10s. shares further strengthened to 20s. 6d., Boake Roberts 5s. shares were 31s. 6d., and Pest Control 5s. shares 7s. 4½d. Amber Chemical 2s. shares, were 2s. 9d., F. W. Berk 2s. 6d. shares 12s. 9d., and Bowman Chemical 4s. shares were 6s. British Chemicals and Biologicals 4 per cent preference shares were 17s. 6d., W. J. Bush 5 per cent preference 22s. 9d., and L. B. Holliday 4½ per cent preference 19s. 9d., while Woolley 4½ per cent debentures were 104½.

There was a firmer tendency among plastics and allied shares with British Xylonite at 86s. 10½d. on the good impression created by the interim dividend. British Industrial Plastics 2s. shares firmed up to 6s. 9d., and De La Rue to 24s. 3d. Elsewhere, however, United Molasses eased to 46s. 3d., Turner & Newall at 85s. 3d. were steady again on market hopes that a higher dividend is in prospect, while the 4s. units of the Distillers Co. were well maintained at 19s. 7½d.

British Glues 4s. units further strengthened to 21s. 9d., British Aluminium have been steady at 43s. 3d., with British Oxygen at 90s. 6d. Lever & Unilever have firmed up to 43s. 6d. United Glass Bottle at 76s. 10½d. were again well maintained and Triplex Glass 10s. units remained active at 27s. 1½d. Glaxo Laboratories 10s. units have also been active up to 53s. 6d. Dunlop Rubber eased to 63s. 9d., awaiting full details of the company's big new capital plans. Borax Consolidated at 55s. were well maintained, while British Match shares showed firmness at 33s. 6d.

Iron and steels generally recorded only small movements on balance, although Guest Keen at 48s. responded to the company's higher interim dividend, and Babcock & Wilcox were well maintained at 65s. 3d. Shares of steel companies scheduled for nationalisation were again inclined to recede, although they are well below their " take-over " levels.

## Market Reports

THE demand for industrial chemicals for home use and for export has been fully maintained and most sections report a ready outlet for available supplies. The continued tightness of commodities, particularly the non-ferrous metals, is shown in the position of the chemical compounds; a further increase in the controlled price of pig lead has resulted in dearer prices for white and red lead. The new basis prices per ton, operating as from November 1, are: dry white lead £161, ground white lead £177 10s., red lead £154, ground in oil £173 10s., orange lead £166, ground in oil £185 10s. The price of chemically pure glycerin for ton lots in 10 cwt. returnable drums is now 227s. 6d. per cwt. Quotations in other directions are firm, with a tendency towards higher levels. The coal tar products market shows little change of importance; there is still a steady pressure for supplies of most items and no easing of the export demand.

MANCHESTER.—Firm price conditions continue in virtually all sections of the Manchester chemical market and there has been a further stiffening in values of the lead compounds as a result of the higher price of the metal. There is a steady demand for most lines and current delivery specifications, especially for the alkalis, represent a substantial tonnage. Fresh inquiries have been numerous and there have been fair additions to the already heavy order-books. The call for fertilisers is about up to the average for the time of the year and steady pressure for supplies has been reported.

GLASGOW.—There has been a considerable increase in inquiries for chemicals and raw materials during the past week. Increased home demands have affected the export market.

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# Patent Processes in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patents Office, Southampton Buildings, London, W.C.2, at 2s. each. Higher priced photostat copies are generally available.

## Complete Specifications Accepted

Production of phosphatic fertilisers, particularly of superphosphate.—E. Potter. (Montecatini Soc. Generale Per l'Industria Mineraria E. Chimica). Oct. 14 1948. 645,674.

Buckets, more particularly for acids and other corrosive liquids.—F. S. Zabala. Oct. 15 1948. 645,742.

Pinchcocks or burette clips.—Universal Woodworking Co., Ltd., and C. Westwood. Aug. 4 1949. 645,814.

Purification of polymyxin.—Wellcome Foundation, Ltd., and S. Wilkinson. Nov. 30 1949. 645,750.

Manufacture of stable emulsions of artificial resins.—Ciba, Ltd. Nov. 30 1948. 645,926.

Stabilisation of dialkyl haloacetals.—General Aniline & Film Corporation. Dec. 14 1948. 645,680.

Extraction of organic compounds dissolved in water.—Ransom & Son, Ltd., and R. A. G. Stockdale. May 11 1948. 645,928.

Devices intended to effect the penetration of an object by the detonation of an explosive charge on the exterior thereof, for military and like uses.—I.C.I., Ltd., and J. Taylor. Aug. 9 1944. 645,611.

Metallurgical processes for producing materials or articles of platinium or allied metals, or their alloys, and materials or articles made by or from the products of such processes.—Lodge Plugs, Ltd., and C. J. Smithells. Oct. 24 1944. 645,541.

Method and apparatus for coating articles by electrostatic deposition.—H. J. Ransburg, H. G. Ransburg, H. P. Ransburg, and E. M. Ransburg [trading as H. J. Ransburg Co.]. Jan. 23 1946. 645,512.

Lubricants comprising organosilicon compounds.—F. J. Sowa. Nov. 22 1946. 645,339.

Preparation of mineral-oil solutions of calcium or zinc salts of dithiophosphoric acid esters.—American Cyanamid Co. Jan. 7 1947. 645,845.

Sodium-vapour darkroom lamps.—Philips Lamps, Ltd. Jan. 20 1947. 645,346.

Alpha-acyclamido acetic ester compounds.—Merck & Co., Inc. Jan. 25 1947. 645,402.

Method for the separation of wax from crude wax and bitumen.—A. F. Sundgren, and E. E. Ekman. Feb. 10 1947. 645,613.

Polymeric material and process of producing same.—B. F. Goodrich Co. Feb. 24 1947. 645,350.

Acid-resisting, micro-porous material and method of making the same.—Oldham & Son, Ltd., and F. Booth. April 15 1948. 645,354.

Polyvinyl acetate and a polymerisation catalyst for use in its production.—Shawinigan Chemicals, Ltd. May 20 1947. 645,405.

Therapeutically active alkaloid preparation.—Sharp & Dohme, Inc. Aug. 7 1947. 645,618.

Bactericidal and fungicidal composition.—Buckman Laboratories, Inc. Aug. 21 1947. 645,409.

Poly-acetoacetyl derivatives of polyamines as azo coupling components in diazotype photoprinting material.—General Aniline & Film Corporation. Oct. 13 1947. 645,495.

Stilbene derivatives for use in whitening textile materials.—I.C.I., Ltd., and R. H. Wilson. Oct. 13 1948. 645,413.

Process for the preparation of a water soluble oestrogenic hormone substance.—Ayerst-McKenna & Harrison, Ltd. Nov. 8 1947. 645,414.

Process for the production of viscose rayon threads.—A. Abbey. (Spolek pro Chemickou A Hutni Vyrobu, Narodni Podnik). Dec. 29 1947. 645,422.

Lubricating compositions.—Aluminum Co. of America. Jan. 9 1948. 645,425.

Methods for the production of sulphanilic acid amide compounds.—A. Benyon A/S. Jan. 19 1948. 645,429.

Process of making vanillin.—Marathon Corporation. Jan. 20 1948. 645,430.

Manufacture of glutamic acid.—International Minerals & Chemical Corporation. Jan. 21 1948. 645,431.

Luminescent materials.—General Electric Co., Ltd., A. H. McKeag, and P. W. Ranby. Feb. 23 1949. 645,502.

Reduction of the powders of the oxides of iron or iron alloys.—Mantle Lamp Co. of America. Feb. 9 1948. 645,435.

Glands for stirred autoclaves.—I.C.I., Ltd., and H. B. Wood. Feb. 25 1949. 645,439.

Fumigating compositions.—I.C.I., Ltd., J. Gillies, and J. Rowe. Dec. 22 1948. 645,440.

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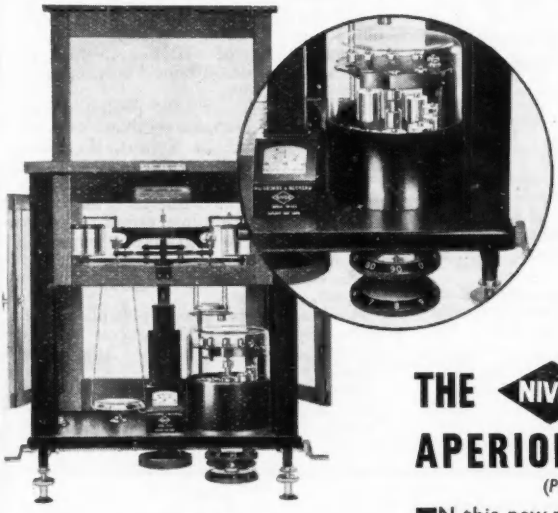

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B.6

Thermoplastic flexible stripping and the method of manufacturing it.—Melwood Thermoplastics, Ltd., and A. W. Meldrum. March 9 1949. 645,625.

Apparatus for separating gas from a liquid and float valves adapted for use therein.—Shell-Mex & B.P., Ltd., and J. W. Ridgeon. March 14 1949. 645,626.

Colouring of aluminium and its alloys.—United Anodising, Ltd., and L. G. Tottle. April 20 1949. 645,443.

Heat hardening of pellets of iron ore concentrates.—Erie Mining Co. March 23 1948. 645,444.

Method and apparatus for coating articles by electrostatic deposition.—H. J. Ransburg, H. G. Ransburg, H. P. Ransburg, E. M. Ransburg [trading as H. J. Ransburg Co.] and R. C. Noyes. Jan. 23 1946. 645,629.

Separation of dimethylphenols.—Monsanto Chemicals, Ltd., E. Roberts, and M. J. Rose. Jan. 25 1949. 645,446.

Electrolyte for and method of anodically polishing aluminium.—Battelle Development Corporation.—April 26 1948. 645,453.

Insecticidal compositions.—N.V. De Bataafsche Petroleum Maatschappij. May 28 1948. 645,458.

Casein products.—B.X. Plastics, Ltd., P. G. T. Hand, A. E. Judd, and V. I. Furness. May 4 1949. 645,461.

Centrifugal separator and a method for the use thereof.—Separator A/B. June 4 1948. 645,463.

Interference microscope.—J. St. L. Philpot. May 24 1949. 645,464.

Preparation of siloxanes.—Soc. des Usines Chimiques Rhone-Poulenc. June 15 1948. 645,389.

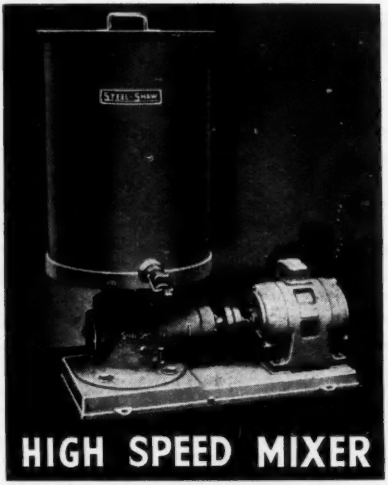
Production of artificial protein threads, filaments and the like.—Courtaulds, Ltd., L. E. Hodges, C. L. Knight, W. Walker, and R. L. Wormell. June 14 1949. 645,390.

Shaped explosive charge.—E. I. Du Pont de Nemours & Co. June 18 1948. 645,466.

Treatment of cellulose esters to improve their resistance to degradation by sunlight and ultra-violet light.—Courtaulds, Ltd., W. G. Cameron, and L. F. H. Breens. July 20 1949. 645,392.

Manufacture of mixed phosphatic fertilisers.—Spolek Pro Chemickou A Hutni Vyrobu, Narodni Podnik. Aug. 4 1948. 645,468.

Process for inhibiting acid attack on brick and the like.—N.V. De Bataafsche Petroleum Maatschappij. Aug. 18 1948. 645,470.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# CLASSIFIED ADVERTISEMENTS

## SITUATIONS VACANT

THE Civil Service Commissioners invite applications for appointments as **SENIOR SCIENTIFIC OFFICER** and **SCIENTIFIC OFFICER** to be filled by competitive interview during 1950. Interviews began in January and will continue throughout the year. Successful candidates may be appointed immediately. The posts are in various Government Departments and cover a wide range of scientific research and development in most of the major fields of fundamental and applied science. Candidates must have obtained a university degree in a scientific subject (including engineering) or in mathematics with first or second-class honours, or an equivalent qualification, or possess high professional attainments.

Candidates for Senior Scientific Officer posts must in addition have had at least three years' post-graduate or other approved experience.

*Age Limits*: For Senior Scientific Officers, at least 26 and under 31 on 1st August, 1950; for Scientific Officers, at least 21 and under 28 (or under 31 for established civil servants of the Experimental Officer class) on 1st August 1950.

*Salary Scales*: for men in London Senior Scientific Officers, £700 × 25 - £900; Scientific Officers, £400 × 25 - £650. Rates for women are somewhat lower.

Further particulars from the **Secretary, Civil Service Commission, Scientific Branch, Trinidad House, Old Burlington Street, London, W.1,** quoting No. 2887. 9084/100/JS

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No. 209 One **HORIZONTAL "U"-SHAPED MIXER,** steel built, riveted, measuring about 8 ft. 3 in. long by 3 ft. wide by 3 ft. 3 in. deep, with horizontal shaft, fitted with bolted-on mixing arms about 18 in. long by 4 in. wide, with intermediate breakers, and driven at one end by a pair of spur gears, with countershaft, fast and loose belt pulleys, outer bearing and plug cock type outlet at the opposite end, mounted on two cradles fitted to two R.S.J. running from end to end.

No. 210 One **HORIZONTAL MIXER** as above.

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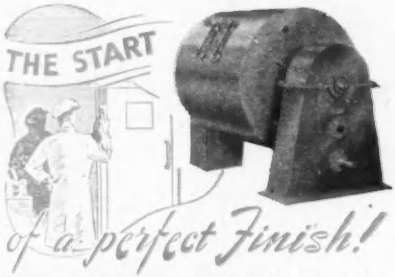


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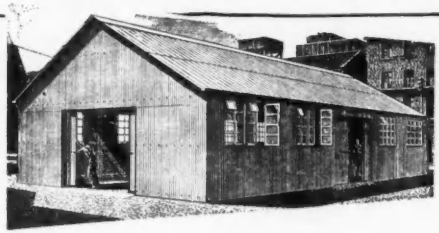

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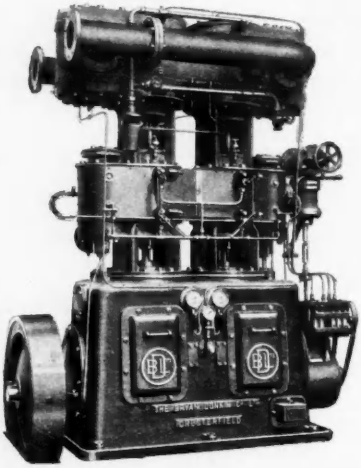

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